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The impact of port governance and infrastructures on maritime containerized trade on the West Coast of Latin America

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Abstract. Latin American countries have historically had a strong dependence on trade, and are mostly characterized by being exporters of raw materials and importers of manufactured products. This fact has brought about a less negative impact of the world crisis on economic growth, mainly because of the high prices of raw materials. This paper focuses on this geographical area (the West Coast of Latin America) between 2008 and 2015, and adds to the literature by assessing institutional, port-related and economic factors that influence maritime transport. The analysis makes use of panel data models with fixed and random effects where the Hausman test has been applied in order to define a solid specification of all the ports, as well as to discount the particular peculiarities of each country. It is shown that the analysis of maritime transport requires the analysis of a number of variables apart from trade (volume of TEUs), infrastructures, superstructures (number of calls, gantry cranes), and that other variables, such as port governance, which are sometimes difficult to quantify, need also to be taken into account.

Keywords. Port Governance; Maritime Trade; Latin America; Panel Data.

JEL classification. C33; N76; R42

1. Introduction

Latin America represents 8% of the world's Gross Domestic Product. From 2008 to 2016, the yearly growth rate of its GDP has been 2.08%, and its population represents 8.5% of the world's total (World Bank, 2017). The world crisis of this century has produced a recession in all develop economies, severely affecting the economies of the United States and the European Union, and causing a fall of world growth and trade. However, the Latin American countries have managed to avoid major consequences from the global crises, and they have experienced some economic growth. This is mainly explained by the intense trade of raw materials with Asian countries, especially China (ECLAC, 2014).

According to UNCTAD (2017), 80% of international trade is carried out by sea. In addition, the importance of seaports for Latin America's growth is rooted in the region's colonial history and its natural endowment (Serebrisky et al., 2016). Latin America's economy has long depended on international seaborne trade (agricultural products and extractive industry) and imports of consumer goods, purchased with the capital accrued from those commodities (Serebrisky et al., 2016; ECLAC, 2014). The continued growth of maritime trade across Latin America and the increase in vessel sizes have both contributed to the expansion of container handling facilities, and enabled new institutional reforms to accommodate the increasing demand. The objective of this paper is to identify the institutional factors and the main port characteristics that favor the movement of containerized goods in the ports on the West Coast of Latin America located in Chile (Antofagasta, Arica, Coronel, Iquique, Lirquén, Mejillones, San Antonio, San Vicente and Valparaíso), Colombia (Buenaventura), Costa Rica (Caldera), Ecuador (Esmeraldas y Guayaquil), El Salvador (Acajutla), Guatemala (P. Quetzal), Mexico (Ensenada, Lázaro Cárdenas and Manzanillo), Nicaragua (Corinto), Panama (Balboa) and Peru (Callao, Matarani and Paita).

This paper is structured in six sections: an introduction; the second section, a bibliographic review; the third, a description of the variables that are going to be used and the modelling; the fourth, the results of the model; and, finally, the conclusions and the bibliography.

2. Background

Studies of international economics, especially on economic growth, underline the relationship between growth and trade (Romer 1990; Rivera-Batiz and Romer 1991). The related empirical literature is quite recent, and in particular, studies that relate maritime transport and economic growth are relatively scarce (Grossmann *et al.,* 2007). Radelet and Sachs (1998), Redding (2002), and the series "Review of Maritime Transport" of UNCTAD as of 2007 (UNCTAD, 2017) have begun to address these issues.

Containerized maritime transport of goods, which enjoy the benefits of the economies of scale and, therefore, reduced costs incurred in the transportation of large volumes of goods, constitutes a good reference for assessing the impact of maritime traffic on the economic growth and development of any country (Bernhofen *et al.*, 2016; Rodrigue *et al.*, 2013). In addition, it should be considered that containerized cargo comes mainly from the secondary and tertiary sector activity (Guisan, 2013; Kenessey, 1987). Indeed, Corbett and Winebrake (2008) find a very strong association, around 90%, between the US Gross Domestic Product and the volume of containerized goods.

The ECLAC carried out a first attempt to highlight the economic importance of the port infrastructures of Latin America and the Caribbean in the complex and changing global scheme of maritime routes in 2004 (in full rise of the price of raw materials), by analysing the supply and demand for maritime services, the price of freight, ownership of the fleet and the regime of port governance (Sánchez, 2004). UNCTAD (2017) and Fay and Morrison (2006) also highlight for the first time the central role that Latin America could play in relation to international shipping patterns. These works emphasize the need to take advantage of the economic impulse provoked by the high prices of raw materials; something which, according to some authors, has not been taken advantage of properly in terms of reducing inequality and increasing the quality and efficiency of infrastructures (Bitar, 2016).

Research efforts on different port governance systems resulted from the "port devolution" process that began around the year 1945 in the United Kingdom (Baird, 1995, 1999, 2000; Goss, 1998; Baird and Valentine, 2006; Pettit, 2008). Baird (1995, 1999, 2000), which formulated the "port function privatization matrix", wherein he made a classification based on the public and private nature of what he considered to be the most important factors. Later, Baltazar and Brooks (2001), taking Baird as a reference, presented the "port devolution matrix", where three port functions are specified (regulator, owner and operator), classified into public, private or mixed. In 2007, the World Bank published the "Port Reform Toolkit", which proposes one of the simplest and clearest classifications of port reforms, and permits to identify the public or private nature of the institutions involved carrying out a series of port functions. Under these hypotheses, the results are four models of port governance: public service port, toolport, landlord port and private service port. In each of them, the following functions are to be analyzed: port administration, nautical administration, infrastructure (nautical or port), superstructure (equipments and buildings), cargo handling, and other port facilities such as pilotage, dredging, tugboats, mooring, etc. In this research, they also record the balance between private risk and the importance of the mandatory regulations that exist in each port model according to its private or public dimension.

The public service port model refers to those ports whose ownership, planning, management and operation are entirely in the hands of the public sector. That is, besides providing all port services, the state also owns the land, infrastructure and superstructure. It is a model in declining use (World Bank, 2007), which worked in Latin American countries before what we could call the port "modernization"; that is, prior to the enactment of the port laws during the last two decades, which usually coincide in this case with obsolete labour regimes and lacking new technologies (Hoffman, 1999).

In the toolport model, although the public sector is the owner of the infrastructure and in charge of the operations and management of the port, they grant, however, some operational services, such as stowage, pilotage, supply, storage, etc. to legal business units with some percentage of representation either by the state or purely private. Some Latin American countries have used this intermediate modality to exercise port governance during periods of transition between the promulgation of port modernization laws, which in certain cases can, together with the starting of the new management, take up to ten years.

In the landlord model, a state entity is the owner of the land (individual Port Authority or supra-local agency/institution), but it transfers via a concession contract the operation and management of the port infrastructures to a second entity, which may be a private, public or mixed company, depending on the legislation applicable to the case (Cabrera *et al.*, 2015). The transition from the toolport model to the landlord model takes place in the 1980s, and is typical in European Union countries (Hoffmann, 1999), as well as in the port system of those countries signatories of the North American Free Trade Agreement. -NAFTA- (Fawcett, 2006).

The private service port model involves the privatization of all elements, including ownership of the land, with the public sector only retaining a standard regulatory supervision power. The first case of application of this model took place in 1981 with the privatization of all British ports, under the control of the Associated British Ports Holding (Pettit, 2008). At present, we can mention other countries with governance tensions tending to favour the total privatization of this service, such as Argentina, Chile, Colombia, Malaysia, Mexico, New Zealand, the Philippines and Venezuela (Pettit, 2008). Another manifestation of this model is called terminalization, or the assumption of terminal operators once established the granting of the functions of the Port Authority, which is relegated to the role of mere spectator (Verhoeven, 2010; Slack, 2007).

Rodrigue *et al.* (2013) point out that the concept of port governance is transcendental when analysing a port; in fact, he remarks it as the third essential pillar to define the function of a port. The concept of port governance arises out of the need of the ports to present a clear organizational structure and efficient management in the transport service. This definition is currently used by most researchers.

Sánchez *et al.* (2015) present the challenges and opportunities that the seaborne transport and port development represent for Latin America and the Caribbean, introducing the theme of sustainability as a transversal axis in the improvement of infrastructures. In addition to the improvements in infrastructures it is important to highlight the importance of other factors such as the characteristics of the port terminal or the governance system, factors that many authors have investigated in relation with the concept of efficiency (Serebrisky *et al.*, 2016; Chang and Tovar, 2014; Núñez-Sánchez and Coto-Millán, 2012; Ramos-Real and Tovar, 2010; Coto Millán *et al.*, 2000; Roll and Hayuth, 1993).

3. Methodology

To analyze the relationship between TEUs, GDP and port variables, a regression panel data model has been used with the aim of achieving consistent and efficient estimators of the partial effects of the observable independent variables on the dependent one, expressed as $\beta = \partial E[y_{it} \mid x_{it}]/\partial x_{it}$ (Greene, 2001). Estimates are made in the statistical program Stata 13.

In addition, the structure of the data facilitates the use of this methodology, since the time variable is smaller than cross-sectional observations (N <T). The choice of the eight-year period (2008-2015) was based on the progress of maritime transport both in terms of development of infrastructures and increase in the frequencies of commercial routes in the geographical area subject to this analysis (AIS, 2017).

3.1. Data

A description of the variables used for this study is presented in Annex 1. This is information extracted from ECLAC (2017), annual volume of containerized merchandise, in fact the only database that provides information on the number of TEUs operated in each of the ports of Latin

America; World Bank (WB, 2017), growth indicator; AIS (2017), number of ships that have made calls at the port; (several sources[1]) dummy of governance and the existence of container cranes, for the period analyzed.

TEUs: container movements are expressed in TEUs (WB, 2016) of ports on the Pacific coast of Latin American countries. In 2008, the ports with the largest number of container movements were Balboa (2,167,977 TEUs), Manzanillo (1,409,782 TEUs) and Callao (1,203,315 TEUs). In 2015, the ports with the largest movement of containers are the same, but they have experienced significant increases: Balboa with an interannual increase of 6.49% (3,294,113 TEUs), Manzanillo with 9.30% (2,458,135 TEUs) and Callao with 7.24% (1,900,444) TEUs).

GDP: Gross Domestic Product in constant dollars of 2011 in Power of Purchasing Parity (hereinafter, PPP) for the countries analyzed. In 2008, the countries with the highest GDP were Mexico (1,050 $\cdot 10^9$ \$), Colombia (272$\cdot 10^9$ \$) and Chile (208$\cdot 10^9$ \$). In 2015, the countries with the highest GDP are again Mexico with an interannual growth of 1.90% (1,210$\cdot 10^9$ \$), Colombia with a growth of 2.83% (359$\cdot 10^9$ \$) and Chile with 3.31% (263$\cdot 10^9$ \$).

Dg1: dummy variable that takes value 1 when ports are fitted with gantry cranes and 0 when not. In 2008, the ports equipped with this type of cranes for the container loading/unloading operations were Balboa, Buenaventura, Callao, Ensenada, Guayaquil, Lazaro Cardenas, Manzanillo, San Antonio and Valparaíso. In 2015, the ports of Coronel and Paita will be linked to the previous list.

NB: number of annual vessels calling at the ports analyzed. In 2008, the ports with the highest figures were Balboa (729), Manzanillo (652) and Guayaquil (439). In 2015, the ports with the highest number of calls are the same, with Balboa showing an increment of 2.49% (874), Manzanillo continues to be second with an interannual rate of -0.19% (642) and Callao takes a third position with an interannual increase of 3.43% (455).

Governance: dummy variable that takes value 1 when the governance system has a landlord structure and 0 otherwise. In 2008, 18 of the 23 ports analyzed had a landlord structure, whereas Acajutla, Callao, Corinto, Esmeraldas and Puerto Quetzal had a toolport or service port governance system. In 2015, there will be 20 ports with Callao and Puerto Quetzal, while Acajutla, Corinto and Esmeraldas will continue with a toolport or service port system.

3.2. Model

The models with panel data demand the premise that the transverse variables (N) must be higher than the temporary variables (T), because otherwise we would not be in a case of multidimensional time series (cross-sectional time-series), that is, N> T (in this analysis, 23> 8). The main advantage of the panel data if compared with other analysis is that they allow the estimation of multiple regression coefficients, which could not be carried out either with cross-sectional data or with time series data (Arellano, 1992).

[1](EP Arica, 2017; TPSA, 2017;EPI, 2017;Angamos, 2017;EPA, 2017;EPV, 2017;EPSA, 2017;EPSV, 2017; SVTI, 2017; Lirquén, 2017; Coronel, 2017;TP Euroandinos, 2017; APM Terminals, 2017; DP World Callao, 2017; TISUR, 2017;A.P. Esmeraldas, 2017;AP Guayaquil, 2017**;** SPRBUN, 2017;TCBUEN, 2017;PLP, 2017; SPCaldera, 2017; PCorinto 2017;CEPA, 2017; EPQ, 2017;TCQ, 2017; SCT, 2017)

In the models with panel data, the observations repeat themselves over time for a sample of individual units (Arellano, 1992). Therefore, it can be stated that these models combine both temporal and transversal dimensions; that is, we happen to find variables with a temporary nature which evolve over time and other transversal variables as the different port terminals.

Panel data models can be classified into two large groups: static and dynamic. In this paper a static panel is used. The first researchers to estimate a model with static panel data were Pitt and Lee (1981), who used the maximum likelihood technique. Later on, Schmidt and Sickles (1984) compiled the different possibilities offered by the panel data: fixed effects, random effects and maximum-likelihood. This last method of statistical estimation requires $T \rightarrow \infty$, and for this reason it will not be used in this investigation.

The basic specification of a model with panel data can be expressed as follows (Greene, 2005):

$$Y_{it} = x'_{it}\beta + z'_{i}\alpha + \varepsilon_{it} = x'_{it}\beta + c_{i} + \varepsilon_{it,}$$

where

- Yit is the dependent variable or explained
- $x'it$ is a vector of independent or exogenous variables ($K \cdot 1$)
- $z'i\alpha$ are the individual effects, where zi contains a constant term and a series of individual or group variables, which may be observable or not observable
- β is the slope vector of the equation;
- t refers to the time series that reaches the period T ($t = 1,2, .., T$);
- i refers to the ports, the last port being N ($i = 1,2, .., N$);
- ε_{it} is the random term.

As it has been defined, it is a classic regression model. If zi is observable for all individuals, the model can be treated as an ordinary linear model, and an adjustment by ordinary least squares could be made. The problem arises when zi is not observable, as happens in most cases.

The main objective of this analysis is to achieve consistent and efficient estimators of the partial effects of the independent variables on the dependent variables, expressed as (Greene, 2005):

$$\beta = \partial E\,[yit \mid xit] \,/\, \partial xit$$

The fixed-effects approach takes α_i as a specific constant term for each transversal unit and implies that the differences between transversal units can be captured with differences in the constant term (Greene, 2005).

In order to clarify the structure of the relation between growth and containerized maritime transport, we shall take the econometric specification as starting point for all the ports subject to this analysis:

$$LTEUs_{i,}^{t}=\beta_{i,0}^{t}+\beta_{i,1}^{t}\cdot LGDP+\beta_{i,2}^{t}\cdot LNB_{i}^{t}+\beta_{i,3}^{t}\cdot \text{governance}+\beta_{i,4}^{t}\cdot Dg1+u_{i}^{t}$$

where

- t: 2008 to 2015;
- i: represents each of the ports considered in the model;
- $LTEUs_i^t$: natural logarithm of the volume of containers operated in port i during year t (WB, 2017);
- $LGDP_i^t$: natural logarithm of the GDP of every country considered in the study in year t, expressed in PPP (constant dollars 2011), (WB, 2017);
- LNB_i^t: natural logarithm of the number of ships that have called in every port considered (AIS, 2017);
- $Governance_i^t$: dummy representing the governance system, 1 for the landlord model and 0 for the rest;
- $Dg1_i^t$: dummy that represents the presence of gantry cranes, with the values 1 or 0 depending on whether or not those terminals are equipped with cranes of this type;
- u_i^t: error term.

4. Estimation results

Table 1 presents the results for the models with panel data fixed and random effects, additionally calculating the Hausman test, which is the statistical instrument that indicates the preference for the fixed-effect model (Hausman, 1978; Hausman and Taylor, 1981). This allows to define a solid specification of the set of analysed ports, independently of the peculiarities of each port and country.

In the first place and according to the resolution conditions, the two basic tests H_0:{ β_k=0} (statistic F for fixed effects and Wald Chi2 for random effects) reject the null hypothesis of coefficients equal to zero. On interpreting the results obtained, the Hausman test (Lee *et al.*, 1998; Arellano and Bover, 1995) is rejected, so the regression of fixed effects is used for this purpose.

There is an evident existence of unknown intrinsic characteristics acting on the relationship (rho = .9246). The covariance between the error term and the variables of the model has a value ($COV(v_j,x_{i,j})$=-.6429). Despite the relatively high value obtained, it could be said that the influence of the idiosyncratic factors of each port is under control.

Increase GDP over TEUs

The economic growth of a country expressed in GDP as constant dollar 2011 PPP, should we keep constant the number of calls made by ships, the port governance system and the commercial policy, increases the volume of TEUs by $e^{(0.6193)}$-1= 0.8576.

The evolution of the global containerized supply chain implies that the countries carry out important works of improvement or expansion in their port infrastructures (Notteboom and Winkelmans, 2001). These investments are usually focused on civil engineering objectives: installation of new gantry cranes, extension of berthing lines, construction of new docks, deepening of the draft by dredging, automation of the terminal, increase in the storage surface, installation of multimodal exchange devices, etc. (Tsinker, 2014; Tang *et al.*, 2011).

Increase in the number of vessel calls over TEUs

The first port variable to take into account in the model is the number of ships' calls in the port during the year, so that an increment of one unit produced an increase of $e^{(0.5048)}-1= 0.6566$, in the TEUs. The number of calls derived from the increase in the volume of the container ship fleet (UNCTAD, 2017) does not strongly affect the volume of operated TEUs. However, there is a strong relationship in the geographical area under analysis, which indicates that these increases in capacity have not occurred in most of the ports.

Gantry cranes in port terminals

The second port variable being analyzed is the existence of gantry cranes in the port to carry out the stowage operations. With the available data it is worth mentioning that, with the exception of Balboa, Buenaventura, Callao and Lazaro Cardenas (in some years of the analyzed period), no other port has more than 10 gantry cranes. Moreover, many of them are just equipped with only one unit. The results of the model show that the existence of a gantry crane in the ports results in an increase in the volume of operated containers of $e^{(1.4604)}-1=330.76\%$.

The effect of the governance system over TEUs

The dummy variable represented by the landlord port governance system is significant in the analysis, what indicates its relevancy in relation to the volume of containers moved in the ports. Besides, the implementation of this system in a port gives rise to an increment in the volume of containerized goods of $e^{(0.2877)}-1=33.33\%$ TEUs.

The impact of the landlord model is weak, and it would be necessary, in the future, to continue this process of modernization of the governance systems in Latin America. The modernization of the port sector does not necessarily end with the privatization of infrastructures, but resides, as many researchers point out, in the correct organization of institutions (Notteboom et al., 2013; Lee and Song, 2010; Verhoeven, 2010; De Langen and Pallis, 2007). The structured made by Verhoeven (2010) is the key in this sense. Verhoeven (2010) creates a state entity in the form of an agency (community manager) that provides flexibility to the national port system, fostering competition among different maritime actors, being aware of the need to integrate all the stakeholders involved in the logistics chain. In addition, the different entities of the port system (owner, operator, regulator and community manager) are assigned actions and lines that should be carried out to respond to the needs of port industry. This responds to the structure that the port system must present in order to solve the problems that arise between the different actors of the port logistics chain.

Researchers have pointed out different entities such as the community manager of Verhoeven (2010), the cluster manager of De Langen and Pallis (2007) that are circumscribed in an environment of path dependence (Notteboom *et al.*, 2013) and coopetition (Lee and Song, 2010) that seek to modernize and update existing governance systems.

Table 1. Fixed Effects and Random Effects Model. Dependent variable: LTEUs

LTEUs		**Fixed Effects**	**Random Effects**
Constant	$\beta_{0,j}$	-66.369	12.93
	P>|t|	0.348	0.000
LGDP	$\beta_{1,j}$	0.619	-0.161
	P>|t|	0.027	0.051
LNB	$\beta_{2,j}$	0.504	0.648
	P>|t|	0.000	0.000
Governance	$\beta_{3,j}$	.2877	0.288
	P>|t|	0.098	0.076
Dg1	$\beta_{4,j}$	14.604	11.586
	P>|t|	0.000	0.000
	N	184	184
	F	72.20	
	P>F	0.000	
	Wald Chi2		298.64
	P>Chi2		0.000
	COV(vj,xi,j)	-0.6429	0(def)
	Rho	.9246	.5587
R2	Within	.5181	.4779
	Between	.5028	.8414
	Overall	.4921	.7990
Hausman test	Chi2	26.58	
	P>Chi2	0.000	

Conclusions

The panel data model used to analyse the relationship between the volume of TEUs moved in the port shows a positive relation with all the variables used; the Gross Domestic Product of each country; the number of ships' calls; the use of gantry cranes for the stowage and the existence of a landlord governance system. The estimation by fixed-effects can, with the structure of data panel, be made for the sample of ports, which means that the analysis provides consistent estimators despite the idiosyncratic differences existing between ports.

The relationship between the variation of the Gross Domestic Product of each country and the trade measured in terms of maritime containerized transport is present in this analysis, since GDP produces an effect on the TEUs of e(0.6193)-1= 0.8576.

Moreover, the two characteristics related to port infrastructure and superstructure are the number of ships' calls and the existence of gantry cranes. First of all, the number of calls made at the port can be inferred as a measure of the berth line, and this is a real fact, since taking advantage of economies of scale we can see that the present increase in the capacity of the vessels calls for longer lines of berthing and thus less port calls. The model shows that the increase in the number of calls causes an effect on the TEUs of e(0.5048)-1= 0.6566. In the same way, the existence of gantry cranes is important, especially for the region to which we are referring and with recent investments in infrastructure and port superstructure. Besides, most of the analysed ports have less than 10 container cranes for their stowage/unstowage operations, and consequently, just the existence of at least one gantry crane means an increase in the volume of TEUs moved in port of e(1.4604)-1= 3.3076.

In addition, the transport sector is a highly regulated worldwide sector, not only for its importance and impact on countries' economies, but also for the fact that in most countries the port infrastructure is state property, and therefore its correct operation depends on government's behaviour. Huge private capital investments are made based on exploitation concession contracts on account of the so-called regulation landlord, giving rise to an effect on the TEUs of e(0.2877)-1= 0.33333 in those countries under analysis.

It is necessary to establish a legislative framework that provides the public institutions necessary for the proper functioning of the port industry and that includes all the stakeholders of the multimodal transport logistics chain. This means that it is imperative to generate a correct association between public-private entities in the global supply chain.

Finally, and based on the results obtained, it can be verified that the analysis of (the) maritime transport requires considering other aspects on the West Coast of Latin America, not only trade (volume of TEUs), but also the infrastructures and superstructures of ports (number of calls, gantry cranes), as well as other variables which are sometimes difficult to quantify, such as (the) port governance.

This analysis is necessary for the public authorities of the West Coast countries, which should promote investments in maritime transport infrastructures, as well as carry on with the development of the legislative framework of the port governance system, in order to strengthen trade and economic growth.

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Annex 1. Data section

Descriptive statistics

Mean values (year: 2008)

	TEUs	GDP	NB	GOV	DG1
Acajutla	157415	2.1813E+10	39	0	0
Antofagasta	76685	2.08E+11	56	1	0
Arica	116720	2.08E+11	34	1	0
Balboa	2167977	2.691E+10	729	1	1
Buenaventura	743295	2.72E+11	211	1	1
Caldera	169827	3.5858E+10	67	1	0
Callao	1203315	1.35E+11	357	0	1
Corinto	58885	8711343160	28	0	0
Coronel	968	2.08E+11	11	1	0
Ensenada	110423	1.05E+12	75	1	1
Esmeraldas	54885	6.6808E+10	13	0	0
Guayaquil	874955	6.6808E+10	439	1	1
Iquique	334302	2.08E+11	193	1	0
Lázaro Cárdenas	524791	1.05E+12	103	1	1
Lirquén	231397	2.08E+11	70	1	0
Manzanillo	1409782	1.05E+12	652	1	1
Matarani	19824	1.35E+11	24	1	0
Mejillones	97226	2.08E+11	97	1	0
Paita	138993	1.35E+11	57	1	0
Puerto Quetzal	280281	3.9975E+10	231	0	0
San Antonio	687864	2.08E+11	165	1	1
San Vicente	604560	2.08E+11	125	1	0
Valparaíso	946921	2.08E+11	225	1	1

Mean value (year: 2015)

	TEUs	GDP	NB	GOV	DG1
Acajutla	190708	2.3606E+10	78	0	0
Antofagasta	77467	2.63E+11	70	1	0
Arica	226893	2.63E+11	90	1	0
Balboa	3294113	4.2242E+10	874	1	1
Buenaventura	911533	3.59E+11	280	1	1
Caldera	235268	4.4415E+10	92	0	0
Callao	1900444	1.86E+11	455	1	1
Corinto	138006	1.1246E+10	48	0	0
Coronel	471426	2.63E+11	108	1	1
Ensenada	193424	1.21E+12	121	1	1
Esmeraldas	59413	8.6639E+10	26	0	0
Guayaquil	1704730	8.6639E+10	380	1	1
Iquique	227099	2.63E+11	113	1	0
Lázaro Cárdenas	1068747	1.21E+12	403	1	1
Lirquén	164994	2.63E+11	38	1	0
Manzanillo	2458135	1.21E+12	642	1	1
Matarani	20002	1.86E+11	6	1	0
Mejillones	223124	2.63E+11	70	1	0
Paita	214483	1.86E+11	42	1	1
Puerto Quetzal	389329	4.9883E+10	30	1	0
San Antonio	1170184	2.63E+11	259	1	1
San Vicente	456176	2.63E+11	83	1	0
Valparaíso	902542	2.63E+11	136	1	1

Mean values

	TEUs	GDP	NB	GOV	DG1
Acajutla	163017.125	2.224E+10	50.875	0	0
Antofagasta	87538.25	2.3463E+11	77	1	0
Arica	169788.625	2.3463E+11	69	1	0
Balboa	2928101	3.3831E+10	961.5	1	1
Buenaventura	783770.875	3.125E+11	219.75	1	1
Caldera	180315.25	3.9631E+10	70.75	0.875	0
Callao	1602763	1.6038E+11	402.375	0.75	1
Corinto	86173.125	9653495299	38.875	0	0
Coronel	248021.375	2.3463E+11	65.75	1	0.875
Ensenada	136824	1.1088E+12	94.375	1	1
Esmeraldas	69158.5	7.6771E+10	28.375	0	0
Guayaquil	1322721.5	7.6771E+10	404	1	1
Iquique	254012.875	2.3463E+11	151.75	1	0
Lázaro Cárdenas	903142.375	1.1088E+12	306.875	1	1
Lirquen	190730.125	2.3463E+11	55.375	1	0
Manzanillo	1839708.75	1.1088E+12	671.875	1	1
Matarani	18952.5	1.6038E+11	18.75	1	0
Mejillones	146695	2.3463E+11	97	1	0
Paita	161617.125	1.6038E+11	67.5	1	0.375
Puerto Quetzal	313757.5	4.4081E+10	99.625	0.75	0
San Antonio	968246.5	2.3463E+11	241.25	1	1
San Vicente	482269.125	2.3463E+11	103.875	1	0
Valparaíso	905290.375	2.3463E+11	205.375	1	1

Source for all descriptive statistics: Data ECLAC (2017), WB(2017), AIS(2017); own elaboration