



A Liner Shipping Services Trade Restrictiveness Index (STRI) for Asia Pacific Economies

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This paper deals with trade in international liner shipping services. It explains when trade occurs in the sector and how articulate the various modes of supply. It also describes barriers to trade affecting the sector and it explains how these regulations are likely to impact marginal costs, competition and eventually freight rates. The final objective of the paper being to construct an original index measuring the overall intensity of restrictions to trade existing in the sector. Such an index is of particular interest since it enables comparison across economies and can easily be included in quantitative impact assessments. The original liner shipping Services Trade Restrictiveness Index (STRI) computed in this paper is based on discussions and exchanges with experts and professionals, it is constructed using established methodologies developed by the OECD and high quality information on the regulatory regime effectively applied by economies. The index dataset suggests that the less developed and opened economies are likely to have the most restrictive international shipping regulatory regime.

Keywords: International trade in services, Trade policy, International shipping, Services regulations, Services trade restrictiveness index

JEL classifications: L92, F1, F13

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1. Introduction

This paper deals with trade regulations affecting the international liner shipping sector. Liner shipping is a key intermediate service. The sector is of particular interest since around one third of international trade in volume (mainly manufactured and semi-manufactured goods and some raw materials) is transported in liner vessels. Furthermore, liner shipping trade regulations are a crucial issue. Indeed, trade-restricting regulations are likely to affect the sector's efficiency, and notably freight rates. Therefore, these restrictive regulations are likely to lead to additional trade costs affecting the economies' competitiveness, their integration to international trade, and finally their welfare. Since barriers to trade in goods have sharply decreased over the last decades, the share of freight rates in total trade costs has become substantial. Most determinants of freight rates such as distance, trade volume and trade imbalance are "natural". Liner shipping barriers to trade are the only field upon which policymakers can bear to decrease freight rates. Many experts and professionals claim that the liner shipping market is free. However, some restrictions remain and are likely to affect freight rates. In this paper, I focus on barriers to cross-border trade (i.e. trade in mode 1 of supply), commercial presence (i.e. mode 3) and to some extent, to the movement of natural persons (i.e. mode 4).

This paper aims at assessing and quantifying the overall level of restriction in the sector. However, considering the nature of services sector, barriers to trade are essentially regulatory. For economists working on this issue, one challenge consists in measuring the restrictiveness of regulations—in other words, to quantify qualitative information. Toward this goal, various methodologies have been developed. Broadly speaking, they are categorized into two types, bottom-up and top-down approaches—also called direct and indirect measurement, respectively (Deardorff and Stern, 2008). In this paper, I opt for the direct measurement methodology, precisely for the construction of a restrictiveness index. It consists in observing policies to construct a composite index. Services Trade Restrictiveness Indexes (STRIs) are powerful tools providing a broad vision of the regulatory regimes' restrictiveness. They are useful for policy-makers and economists since they enable comparison and benchmarking across economies and sectors (OECD, 2009). Furthermore, STRIs are of particular interest for economists because they can easily be included in quantitative impact assessments. STRIs have been developed first by the Australian Productivity Commission (OECD, 2009). Then, the OECD extended and refined the methodology. Various STRIs have been constructed for a large amount of services sector—see Deardorff and Stern (2008) for a review of this literature. With regards to maritime transport I found two attempts, by McGuire *et al.* (2000) and Li and Cheng (2007).² With respect to the previous attempts, one contribution of this paper is to use the most

² McGuire *et al.* (2000) computed their index for Asia Pacific economies. Kimura *et al.* (2004) and Achy *et al.* (2005) use the McGuire *et al.* (2000) template in order to compute an index for Russia and Maghrebian economies, respectively.

relevant regulatory data available on the applied regulatory regime of economies. Another novelty is to use state of the art methodological developments in order to construct the best possible index. Finally, my index is constructed as closely as possible to the reality thanks to discussions and debates with experts and professionals.

In this paper, I detail the information and methodology used to construct the original liner shipping STRI. It is computed for 32 economies: the 17 most significant Asia Pacific economies (Australia, Brazil, Canada, Chile, China, Colombia, Hong-Kong, Indonesia, Japan, Korea, Malaysia, Mexico, New Zealand, Russia, Singapore, Thailand and the United States) and to enable a comparison, 15 other economies (Algeria, Belgium, Egypt, France, Germany, India, Italy, Morocco, Nigeria, Senegal, South Africa, Spain, Tunisia, Turkey and United Kingdom). The paper is organized as follows: the first section is the introduction. In the second section, I present trade and trade barriers in international shipping. Precisely, I explain how trade occurs, I present restrictions to trade and how these restrictions are likely to affect the sector's efficiency. In the third section, I detail the data and methodology used to construct the index. In the fourth section, I present results. The fifth section concludes.

2. Trade, barriers to trade and regulations in international shipping

In order to provide international shipping services, vessels cross borders. Therefore, international shipping is a tradable service *par excellence*. Furthermore, the importance of international trade in liner shipping can be assessed by considering the importance of the “traffic of thirds” (i.e. maritime transport services provided by a carrier which is neither from the economy that exports nor from the economy that exports the cargo but from a third one) and the high degree of specialization existing in the sector.

2.1. Trade in international shipping

The key concept of modes of supply has been developed in order to facilitate the comprehension of what is trade in services and when it occurs. It is used by the World Trade Organization (WTO) in order to facilitate negotiations on trade liberalization under the General Agreement on Trade in Services (GATS). The mode of supply of services depends on providers' and consumers' nationality and territory of residence. It also depends on the nature of the firm providing the service.³ Mode 1 is

³ According to Article XXVIII of the GATS, in maritime transport, the provider's nationality depends on the economy of registration of the vessel or the nationality of the agent which supplies the service through the operation of a vessel. However, because of complex arrangements involving ownership, mode of operation and chartering and because of the flag of convenience system (i.e. the economy of registration differs from the operator's and the owner's economy of residence), it is often difficult to determine the residence of the operating

cross-border trade. A service of international shipping is traded in mode 1, when it is provided from economy A to economy B. Mode 1 represents the physical access to the market which is needed to provide the service. According to the GATS, a full commitment in mode 1 means that the economy allows all vessels to call at its ports in order to load and unload all types of cargoes. In international shipping, mode 1 has two aspects. The first aspect is reflected by the fact that vessels cross borders physically in order to provide the service. This makes mode 1 the key mode of supply. The second cross-border trade aspect is reflected by the fact that (contrary to many other services) a direct contact between the producer and the consumers is not required. Indeed, technically, international shipping services can easily be booked by phone or by Internet. Then, mode 2 is consumption abroad. It occurs when an agent from economy A consumes a service abroad. Even though trade in mode 2 occurs in maritime transport, it is very difficult to find straightforward examples of barriers to trade in this mode of supply. Therefore, it is excluded from the scope of this paper. Mode 3 is commercial presence abroad. Services of international shipping are provided in mode 3 when a maritime transport company from economy A establishes a commercial presence in economy B to provide services. In maritime transport mode 3 is in turn split into two categories (Box 1).

Box 1: The Mode 3a and 3b in the GATS Maritime Model Schedule

The Draft Schedule on Maritime Transport Services designed to help negotiations at the GATS splits mode 3 into two modes: 3a) and 3b). Mode 3a) corresponds to the establishment of a registered company for the purpose of operating a fleet under the national flag. Mode 3b) is defined as “*the ability for international maritime transport service suppliers to undertake all activities which are necessary for the supply of a partially or fully integrated transport service, within which the maritime transport constitutes a substantial element*”. Nowadays, mode 3a) is less and less relevant. Indeed, since the seventies, international shipping has experienced two linked important changes. First, with the development of the freedom of seas, most international trade can be transported no matter the colour of the vessel’s flag. Second, with the deflagging process, most of international shipping is realized by the owned- and not by the flagged-fleet—in other words, today most vessels are owned by companies established in a economy but flagged in another open or international registry economy. In this paper, mode 3 always relates to mode 3b) according to the GATS definition.

company. Following the Manual on Statistics of International Trade in Services (United Nations, 2002), I consider that the shipping activity is attributed to the economy where the operating firm is incorporated.

Finally, mode 4 corresponds to the temporary movement of individual service suppliers. A service is provided in mode 4 when a natural person moves abroad to provide the service. For instance, regarding international shipping, it could be when a seafarer from economy A works on a vessel operated by a company from economy B or when a worker from economy A is employed by a foreign affiliate resident in economy B.

The degree of complementarity/substituability between modes of supply (notably between mode 1 and 3) depends on the services' characteristics. More specifically, it depends on the service differentiation, the economies' technology level (e.g. the development of ITC—Information and Communication Technologies), the preference of consumers for a direct relation with the service's provider and regulations (Copeland and Mattoo, 2008).

As stated above, mode 1 is the crucial mode of supply in international shipping. And, if vessels operated by foreign companies or flying foreign flags are not allowed to call at a economy's ports to load and unload cargoes, mode 3 is of no interest. Therefore, mode 1 and 3 are not substitutable. However, to some extent, mode 3 can be an important complement to mode 1. First, establishing a commercial presence abroad could be important from the demand's point of view. It is a mean for firms to be closer to consumers and their tastes. As stated by Copeland and Mattoo (2008), it is also important when consumers have a preference for a direct relation with the provider. More specifically to international shipping services, it is important for carriers (at least for a minimum volume of production) in order to develop a network of offices to recruit freight all over the world (and not only in ports) and to fill its vessels with more ease. Second, establishing a commercial presence abroad could be important from the supply's point of view. Indeed, it is important for carriers to establish a commercial presence in order to manage vessels and cargoes within ports abroad—in other words, to handle all steps of the supply chain. Finally, nowadays, international transport is more and more “door to door” and multimodal. Hence, it is important for maritime companies to establish a commercial presence abroad in order to develop partnerships with local transportation firms and then facilitate the land-leg of the journey from the port to the final delivery point of the cargo (Box 2).

Box 2: Maritime agent and agency—establishing or not a commercial presence abroad?

Maritime agents represent the business interests of one or more shipping lines in ports abroad. Their activities consist in selling maritime transport services and organizing port calls. The Draft Schedule on Maritime Transport Services describes the maritime agencies activities as follows: “*the marketing and sales of maritime transport and related services, from quotation to invoicing, and issuance of bills of lading on behalf of the companies, acquisition and resale of the necessary related services,*

preparation of documentation and provision of business information; acting on behalf of the companies organising the call of the ship or taking over cargoes when required.”

All ports request the physical presence of an agent. Some firms have as only purpose to provide such services, but classical carriers operating their own fleet can also provide them. Thus, foreign carriers calling at ports abroad have two choices. They can either contract a firm established in the port or (if regulation allows it) establish their own commercial presence. Both choices can be efficient, and this choice often depends on the economical importance of the port for the carrier.

Interestingly, according to experts and professionals, the mix of mode 1 and 3 in the provision of international shipping services varies according to the market segment (i.e. liner or tramp shipping), the nature of the cargo also influences the mean to provide the service. In general, in tramp shipping, tankers or dry bulk carriers are chartered by a single customer. Therefore, the transaction could easily be arranged by phone or by Internet. In contrast, with liner shipping a company needs hundreds and even thousands of customers to fill a containership—or a general cargo vessel. Hence, in liner shipping the development of an agencies’ network is crucial. A similar comment can be done about the management of cargoes in ports. It is much more difficult to manage ten thousand boxes pertaining to ten thousand customers than 100,000 tonnes of crude oil pertaining to one customer. Consequently, mode 3 is likely to be more important in liner than in tramp shipping. Finally, *ceteris paribus*, mode 1 and 3 are not substitute but rather complement each other to some extent. Mode 1 is the key mode of supply and could also be useful in order to book a transport service or to send documents. Mode 3 is useful to find customers in isolated places, to administrate and organize vessels’ calls and land transport all over the world. Data on trade in international shipping in modes 1 and 3 is available, unfortunately it does not split the sector into liner and tramp shipping. Therefore, it is very difficult to validate assumptions made above (Bertho, 2012). Additionally, it is important to note that the mode 4 of supply is undoubtedly complementary and not substituable with mode 1 and 3. Indeed, with the simultaneous development of the freedom of seas and the deflagging process, trade in mode 4 has become crucial. Today, the nationality of seafarers is different from the colour of the flag, the economy of ownership of the vessel or the nationality of the operating company. To conclude, it is common that international transport services are provided at once through modes 1, 3 and 4: a customer books by Internet a container slot on a vessel to transport a cargo, this vessel is crewed by seafarers of which the nationality is different from the vessel’s operator and finally the vessel and cargo are managed by an office established abroad by the shipping line.

2.2. Barriers to trade in international shipping⁴

This sub-section aims at identifying all regulations which are likely to affect trade in services of international liner shipping. I classified trade restrictions into three categories. The first category regards the mode of supply which is affected by restrictions with a focus on restrictions to cross-border trade (mode 1) and commercial presence (mode 3). Then, restrictions are split into discriminatory or non-discriminatory barriers—the former affects foreign providers only while the latter affects both domestic and foreign providers. Finally, barriers to trade are categorized depending on whether they affect the entry or the operations of firms. A summary of restrictions following this classification is provided in Table 3. Importantly, I will use this classification in the next sub-section to present the theoretical impacts of restrictions on the sector's efficiency.

Regarding cross-border trade (mode 1), the main restrictions are called cargo reservations—or cargo preferences. Cargo reservations are very specific to transport sectors. This restriction specifies that some types of cargo (e.g. government-generated or strategic cargo) can only be transported by some types of vessels—in general by vessels flying the economy's flag or by vessels operated by national or domestic companies. Cargo reservations are discriminatory restrictions to market access and they are restrictions to firms' operations. Generally, the objective of this restriction is to protect national-flag fleets involved in international shipping for security and strategic objectives—they enable to maintain certain skills and qualifications domestically. During the eighties and the nineties, most cargo reservations disappeared (Fink *et al.*, 2002). Indeed, nowadays among a sample of 47, economies only eight apply this restriction. Cargo reservations are mainly applied in developing economies, the United States being the only OECD economy that applies such a restriction (Table 1). Most reservations are put on imports of government cargoes.⁵ As a consequence, they represent a negligible part of world seaborne trade flows. For instance, in the US, between 2005 and 2007, the volume of cargo transported under preference schemes represented around 1.5% of the total seaborne trade (Bertho, 2011). In Brazil, in 2009, 0.18% of the total seaborne import tonnage was reserved to Brazilian-flag vessels (E-mail communication with the Agência Nacional de Transportes Aquaviários—ANTAQ, 2010). However, the revenue generated can be sizeable and represents an important share of the total revenues of carriers transporting reserved cargo. For instance, in the US, between 2005 and 2007 it represented more than 1.3 billion of dollars. Importantly, Fink *et al.* (2002) show that cargo reservations do not influence freight rates anymore.

⁴ These regulations have been identified thanks to discussions and exchanges with experts from the WTO, the French Ministry of Transport and the CMA-CGM.

⁵ According to the US Maritime Administration, a government cargo is moving either as a direct result of Government involvement, through financial sponsorship of a Government program or, in connection with a guarantee provided by the Government.

Table 1: Cargo preference schemes in international liner shipping

Country	Type of cargo	Type of vessel
Bangladesh	Government cargo	Operated by a national shipping line
Brazil	Government-generated cargo, and cargo financed by government programs	Public or semi-public companies
India	Government cargo	Flying the national flag
Indonesia	Government cargo	National shipping line flying the national flag
Lebanon	All cargo	Operated by a national shipping line [a]
Philippines	Government-generated cargo, and cargo financed by government programs	Operated by a national shipping line
Thailand	Government or state enterprise imports	Flying the national flag
United States	Government-generated cargo, and cargo financed by government programs	Flying the national flag

Source: World Bank (2012a). Note: [a] Priority is given to Lebanese shipping lines.

Additionally, some economies do not apply cargo reservations but the principle of reciprocity to cross-border trade, this is the case in Latin-American economies like Chile, Colombia and Mexico. For instance, Bolivia, Brazil, Paraguay and Ecuador apply cargo reservations to Chile that in turn applies such restrictions to these economies (E-mail communication, Chilean Ministry of Transport, 2010).

Another impediment to trade in mode 1 deals with maritime agents.⁶ Some economies require that maritime companies be represented by a particular type of agent in their ports. The degree of restrictiveness of this barrier depends on the type of agent that is required to be appointed. For instance, in Syria companies must appoint a government agency; in Chile and Indonesia, companies must appoint a national agent; and in Australia, companies must appoint a resident. Requiring a government agency is more restrictive than requiring a national agent while requiring a resident is even less restrictive. This restriction is not discriminatory.

The last restriction in mode 1 relates to domestic shipping—also called cabotage. *Stricto sensus*, cabotage consists in providing a transport service between two ports of the same economy. However, because some economies apply a restrictive definition of cabotage, related restrictions can affect international shipping. Indeed, some economies base their definition of cabotage (to differentiate with international shipping) on the journey covered rather than cargoes’ origin. Therefore, these economies regard domestic parts of international shipping journeys (such as international relay) to be cabotage even though the cargo is originating from abroad.⁷ Importantly, cabotage is much more regulated than international shipping and most economies reserve cabotage for national-flag vessels. Hence, vessels that want to perform such international transport services must comply with cabotage requirements. These restrictions prevent carriers from operating their fleets in the most efficient way and they lead to complexities and additional costs related to port passage.

Box 3: Flying the flag

⁶ For more details on maritime agents, please see Box 2 “Maritime agent or maritime agency—establish or not a commercial presence abroad?”

⁷ International relay consists for a company in using two vessels to transport a container. A vessel coming from a economy A unloads a container in the port of a economy B which is not the final destination of the container. Then, a vessel operated by the same company take over the first vessel to transport the container to its final destination—that could be a port of the same economy.

Register a vessel in a economy (which is, in most economies, equivalent to fly the flag of this economy) gives rights and duties. A vessel flying the flag of a economy is under the security and the legal protection of this one. In return, a company that wants to operate a fleet under the national flag has to comply with some requirements. In general, it has to establish a commercial presence in the economy, and pay taxes, a minimum share of the ownership must be national, a minimum share of the crew (including the captain and mates) must be citizens of the economy and vessels operated have to comply with high security, environmental and social requirements.⁸

In contrast to many articles on this field, I do not consider requirements to fly the flag as impediments to trade. First, despite their restrictive nature, requirements to fly the flag are not restrictions themselves but rather coupled with some restrictions (e.g. cargo reservations) and they express the degree of restrictiveness of these restrictions. Second, nowadays most international trade can be (and is) transported no matter the colour of the flag. As an illustration, in 2010, 54% of the world fleet capacity was registered in the ten major open and international registry economies (UNCTAD, 2011).⁹ In other words, in international trade (the situation is different concerning domestic shipping), vessels are no longer discriminated with respect to their flags. Hence, requirements to fly the flag are no longer an issue for carriers and customers.

Regarding mode 3 of supply, most restrictions are common to all services sector. The most obvious barriers to the establishment of a commercial presence are the limitations to foreign ownership that prevent foreigners from entirely controlling liner shipping companies. Some restrictions also exist on the form of the commercial presence. In some economies, the creation of new affiliates has to take the form of a subsidiary and the establishment of branches is prohibited. Furthermore, some economies require the commercial presence of being a joint venture. Limitations on foreign ownership and joint venture requirements can affect distinctly greenfield projects and the acquisition of existing (public or private) domestic entities by foreigners.

In some economies, foreign investors must obtain an authorization before being allowed to invest in a sector. These restrictions are also called screening and approval processes. They are common in strategic and sensitive sectors such as maritime transport. The authorization can be automatic or subject to some requirements and evaluations by the related Ministry or a governmental agency. All these restrictions are discriminatory barriers to entry on the market.

⁸ It is not the case in open registry economies where all these requirements are very low.

⁹ The ten major open and international registry economies are Panama, Liberia, Marshall Islands, Bahamas, Malta, Cyprus, Isle of Man, Antigua and Barbuda, Bermuda, Saint Vincent and Grenadine.

Licensing requirements are also considered barriers to trade in mode 3. This type of restrictions varies a lot across economies. In certain economies, a licence is required in order to establish a business and operate vessels—which is different from requirements to fly the flag of a economy (Boxes 1 and 3). In this case the restriction is non-discriminatory. In other economies, a licence is required to establish a commercial presence only. In this case, only foreigners have to obtain it and the restriction is discriminatory. Regardless of its form, obtaining a licence implies more or less burdensome and costly administrative formalities. Licence criteria may or may not be publicly available. If criteria are fulfilled, licensing may or may not be automatic. This information gives clues on the degree of restrictiveness for market entrance.

Box 4: Barriers to trade—protectionism or response to a market failure?

Because of their nature, services sector are prone to market failures—e.g. economies of scale, imperfect information, externalities. Therefore, they are highly regulated (Copeland and Mattoo, 2008). Regulations have two main objectives, protect domestic providers from the foreign competition and/or respond to market failures. Often, the entanglement of both purposes makes the analysis of barriers to trade in services difficult. In this box, I present regulations that could be seen as protectionist at a first sight but that, in fact, respond to a market failure.

Requirements such as the appointment of particular maritime agents are barriers to trade in the sense of the GATS. However, the main objective of the residency requirement is not a protectionist, it is applied for reasons of tax collection and the management of legal liability. It establishes practical jurisdiction over maritime incidents in territorial waters and ensures that ships do not leave ports without paying their bills. However, requirements to appoint national or governmental agents are indeed protectionist measures. Similarly, the prohibition of creating branches is a restriction on the form of the commercial presence. However, again, this measure aims at establishing a practical jurisdiction over foreign companies. Finally, screening and approval processes and licensing are required in order to make sure of carriers' honesty and solvency. Concerning these regulations, the issue of the boundary between protectionism and response to a market failure is even more difficult to define. Answering this question consists in understanding if the regulation is more restrictive than necessary to pursue the objective.

Interestingly, all regulations presented above aim at dealing with information asymmetries in order to protect consumers and workers, to protect the environment, and globally to avoid negative spillovers for society as a whole.

Turning to restrictions on employment and board of Directors' members; restrictions on employment are impediments to trade in mode 4¹⁰ while restrictions on the board of Directors' members are impediments on the control of investments. Nevertheless, I classify them as barriers to trade in mode 3 because they affect the decision of foreigners to invest abroad indirectly. Such restrictions rely on the people's nationality or residency. They consist in a minimum number or share.

In the same way, restrictions on repatriation of earnings potentially affect the decision to invest in economies. Hence, I classify them as restrictions in mode 3. Usually, they are horizontal restrictions—i.e. restrictions affecting all sectors without distinctions. They prevent foreigners from using, converting and/or transferring the money earned freely. They are discriminatory restrictions on foreign firms' operations.

Moreover, certain regulations are likely to affect international trade even though they are neither barriers to trade in mode 1 or in mode 3. First, a variety of schemes aims at supporting the domestic maritime industry to the expense of foreign providers. These schemes can take the form of subsidies, credit guarantees or tax deferrals and exemptions. They can be alternatively dedicated to support vessels' owners, vessels' operators (international or domestic fleets) or shipyards. Importantly, direct subsidies have become scarce, they are progressively substituted by non-discriminatory fiscal instruments such as the tonnage tax (WTO, 2010). Second, some economies discriminate vessels with regard to the access and the use of ports and related services. These discriminations can be either included or not in the legislation. When they are included in the legislation, national-flag vessels or vessels operated by national or domestic companies have preferential access to port infrastructures and services. These discriminations can be of various natures. They can affect the entering (departing) into (from) ports, they can be put on the use of infrastructures for the loading and unloading of cargoes, they can relate to the collection of port duties and taxes—different amounts or payable in hard currency. Discriminations in the access and the use of ports and related services can also be “silent”. This is frequent in developing economies where port authorities have large discretionary powers. Third, because of potential conflicts of interest or risks of discrimination, government ownership in maritime companies can be considered as an impediment to trade. And, considering the strategic nature of the liner shipping sector, government ownership is a common practice (Table 2).

Table 2: National shipping lines

¹⁰ Here, I refer to restrictions on the temporary movement of managers, executives and specialists—in contrast to restrictions related to vessels' crews required to fly the national flag.

Country	Company	Government stake	Fleet capacity [a]	Comments
Algeria	CNAM Group Spa	100%	1 020	-
China	COSCO Container Lines Ltd	100%	495 512	-
China	China Shipping Container Lines Ltd	100%	455 353	Shipping arm of the state-owned China Shipping Group
Egypt	Egyptian Navigation Co	100%	-	-
Gulf countries	United Arab Shipping Co	100%	165 572	Owned by the governments of Saudi Arabia, Kuwait, Bahrain, Qatar, UAE and Iraq
India	Shipping Corp of India Ltd	100%	31 573	-
Malaysia	MISC Berhad	100%	95 016	Subsidiary of the Malaysian oil group Petronas wholly-owned by the government
Saudi Arabia	National Shipping Co of Saudi Arabia	28%	-	Held by the Public Investment Fund of the Saudi government
Singapore	APL Co Pte Ltd	100%	532 404	Wholly owned by Neptune Orient Line, a subsidiary of Temasek Holdings (government Sovereign Wealth Fund)
Tunisia	Compagnie Tunisienne de Navigation	100%	-	-

Sources: CI Online (2009) and various sources. Note [a] in Twenty-foot Equivalent Unit (TEU).

Finally, in services sector, the regulatory environment and notably the quality of the regulator (generally the related Ministry) is critical. In general, the mission of the regulator is to ensure competition and contestability in the market. In international shipping, the regulator is responsible for the issuance of licences. When a regulator exists, its quality can be estimated thanks to various information, such as the ability to appeal regulatory decisions or the prior notification of regulatory changes.

Table 3: A typology of barriers to trade in services

	Mode 1	Mode 3	Other	Horiz.	Ope.	Estab.	Discr.
Cross border trade							
Cargo reservation	X				X		X [d]
Restriction on the maritime agent	X				X		
Restriction on national parts of international journeys	X				X		X [d]
Commercial presence							
Foreign ownership limitation		X				X [c]	X
Restriction on the form of the commercial presence		X				X [c]	X
Joint venture requirement		X				X [c]	X
Screening and approval		X		X		X	X
Licencing requirement		X				X	[e]
Limitation on employees		X [a]		X	X [b]		X
Limitation on the Board of Directors		X		X		X [c]	X
Restriction on the repatriation of earnings				X	X [b]		X
Other restrictions							
Subsidies and other supports			X		X		X [d]
Government ownership			X		X		[e]
Discrimination in access to and use of ports and related services			X		X		X [d]
Quality of the regulator			X			X	

Source: Author. Note: Horiz. is for horizontal restriction, Ope. is for restriction on operations, Estab. is for restriction on establishment and Discr. is for discriminatory restriction. [a] Restriction in mode 4. [b] Ambiguous, these restrictions are also likely to affect decisions to invest and to enter the market. [c] Ambiguous, these restrictions are likely to affect firms' operations. [d] Discrimination according to the suppliers' nationality or vessels' flag. Hence, requirements to fly the flag is important. [e] Could be discriminatory or not depending on economies.

2.3. Impact of restrictions on the sector's efficiency

The typology established above is used hereafter in order to determine the theoretical impact of barriers to trade on the sector's efficiency. Precisely on freight rates through marginal costs and competition.

First of all, cargo reservations are restrictions on the quantity provided. From a trade policy point of view, they work as a zero quota. Cargo reservations provide a protection to eligible companies by excluding non-eligible providers from the reserved cargo market. Cargo reservations increase the cost to provide the service because it is usually more expensive to transport cargo in national-flag vessels than in vessels registered in open-registry economies. This can be explained by higher labour costs (due to national crew requirements and higher social standards) and higher security and safety requirements. Hence, the protection of the domestic fleet leads to an increase in the price of shipping services. It results in an opportunity cost for reserved cargoes' shippers. As most reservations are put on government cargoes, taxpayers pay the bill. Theoretically, cargo preferences are costly for the economy as a whole because the welfare loss that bears on consumers and taxpayers is larger than the gain for producers. Since cargo reservations work as quotas, they generate rents. Moreover, as stated in Mattoo and Sauvé (2008) "*in the case of goods, the quota rents can be appropriated by domestic intermediaries [...] that are better placed to obtain import licences. However, intermediation is difficult [...] concerning services because they are [...] not storable and directly supplied by producers to consumers.*" Rents are therefore usually appropriated by domestic or foreign firms—depending on various factors such as the regulation and firms' efficiency. Furthermore, in the long run, cargo reservation schemes do not give proper incentives to carriers operating national-flag vessels. Thus, from a dynamic point of view, quotas drive carriers away from international competitive standards and perpetuate the fleet's inefficiency.

Globally, restrictions to firms' operations increase the cost to provide the service. The impact of such restrictions is similar to a tariff in trade in goods. At a given price, providers supply less quantity of the service. Comparatively to trade in goods, in services, barriers are regulatory and therefore purely frictional. Moreover, in contrast to tariffs, regulatory barriers do not generate revenues for governments. It implies that the deadweight loss of protection (and the gain resulting from the liberalization) is higher. Restrictions to firms' operations are likely to affect freight rates through marginal costs.

From a static point of view, restrictions on firms' establishment have the same impact as restrictions on operations but through a different channel. As their name suggests, restrictions on establishment have an impact on the entry of new firms in the market—by prohibiting it (e.g. foreign ownership is banned in the sector), by imposing additional fixed costs (e.g. burdensome licensing processes) or by discouraging investment (e.g. foreign ownership limitation or joint venture requirement). These restrictions reduce the number of providers in the market. As a consequence, domestic prices increase

and the quantity provided decreases. This leads to a decrease of the economy's total welfare. From a theoretical point of view, restrictions on establishment are likely to affect freight rates through the market structure and generate rents. Basically, barriers to trade in mode 3 are restrictions on establishment. However, the boundaries between restrictions in mode 3, restrictions on establishment and restrictions on operations are fuzzy. Indeed, some restrictions in mode 3 such as screening and approval processes and licensing requirements are pure restrictions on establishment. Some restrictions in mode 3 are restrictions on establishment which are likely to affect marginal costs—e.g. providing a service through a joint venture could lead to inefficiencies and additional costs. Furthermore, some restrictions in mode 3 are restrictions on operations which affect establishment by discouraging investments—e.g. limitations on employees, restrictions on the repatriation of earnings. Finally, restrictions in mode 3, which are basically restrictions on Foreign Direct Investment (FDI), are harmful from a dynamic point of view. Beyond their positive impact on the sector's level of competition, FDIs increase the economies' possibility of financing, they facilitate the transfer of technology between economies, and induce positive spillovers in terms of knowledge, skills, experience and organisation. Thus, economies restricting FDI forego all these dynamic benefits.

Concerning production subsidies, the static welfare outcome is different. Because it is subsidised, the production increases. In contrast to barriers on operations and establishment, production subsidies do not affect the supply of foreign providers. And, because subsidies increase the production of eligible providers without raising the cost for consumers, they lead to lesser distortions—since only the production side is distorted but not the consumption one. They also lead to smaller welfare losses. To some extent, for a similar objective (i.e. increase the production of domestic producers) the implementation of such a subsidy can be more appropriate than barriers to cross-border trade and commercial presence. However, subsidies come at great expenses for governments.

Then, an important issue deals with the interaction between modes of supply. Indeed, as modes of supply are complementary, the implementation of restrictions in one mode may prevent providers from using the most efficient mode. In this case, barriers to trade introduce distortions in the mean to provide the service. This may increase the cost to provide the service and affect the quality of the service (Copeland and Mattoo, 2008). Thus, as explained in the previous section, even though mode 1 is crucial in the provision of international shipping services, mode 3 is likely to be more efficient to carry out some activities needed to provide the final service. In such way, there is an opportunity cost in providing some parts of an international shipping service in mode 1 rather than in mode 3. Therefore, restrictions in mode 3 are likely to have an impact on the overall efficiency of the sector.

To conclude this sub-section on barriers to trade in the liner shipping sector, some comments have to be made. First, in liner shipping (as in most services sector), barriers to trade are essentially

regulatory. They are qualitative information which are difficult to include in quantitative impact assessments. Furthermore, several heterogeneous restrictions affect trade in international liner shipping services. Therefore, in order to assess and quantify the overall level of restriction in the sector, I construct a composite index of restriction. Considering the difficulty to collect regulatory information (due to source limitation), it is not possible to include all trade restricting regulations presented in this section in the index. However, the most important restrictions will be included.

3. Methodology

In this section, I detail the data and methodology used to construct the STRI. Precisely, I describe the following steps: the scoring of restrictions, definition of the weighting scheme, aggregation method and robustness check.

3.1. Data and variables included in the index

To begin with, the index deals with regulations restricting commercial presence only. This choice stems from three aspects. First, since the 1980s the most significant barriers to cross-border trade have disappeared. For instance, nowadays cargo reservations only affect very specific goods and they represent a tiny share of total seaborne trade (Section 2). Therefore, they are likely to not affect freight rates (Fink *et al.*, 2002). Second, the regulatory information about barriers to trade in mode 1 is available for cargo reservations only. This lack of data does not make necessary, the construction of a composite index for this mode of supply.¹¹ Third, even though mode 1 is the key mode of supply for international shipping services, mode 3 is likely to be crucial in order to efficiently provide liner shipping services.

In the previous section, I identified twelve regulations that are likely to affect commercial presence of foreign firms in the liner shipping sector. However, considering the difficulty to collect regulatory information (because of limited sources and information), I am not able to include all trade restricting regulations in the index.

As the main source of regulatory information, I use the World Bank Services Trade Restrictions Database (World bank, 2012a). This database provides information on applied services trade policies for three modes of supply and five sectors: financial, telecommunications, retail, transportation and professional. Regarding international shipping in mode 3, the database reports seven variables—i.e.

¹¹ Considering the information available, the more efficient way to deal with cargo reservations in empirical analysis would be to include dummy variables.

seven types of restrictions. Most variables reported in the World Bank database match the restrictions listed in the previous section. It is the case of the variables ‘Greenfield subsidiary maximum ownership allowed’, ‘Acquisition domestic private entity maximum ownership allowed by a group of entities’, ‘Difference in licensing criteria for foreign and domestic applicants’, ‘Nationality requirement for board of directors’, ‘Right to appeal regulatory decisions’ and the variable ‘Market entry allowed’ that gives information on the form of the ownership. In contrast, I did not mention the variable ‘Limit on number of licenses available’ in Section 2 because it is not relevant with respect to international shipping.

The compilation by the World Bank of comparable information on services trade policy measures for so much economies and services is an unprecedented work. It enables to go further in the analysis of barriers to trade in services. However, the data is not always workable. First, for some variables, the answer rate is low. Thus, only 10% of economies of my sample answered to the question on the licensing criteria. Second, for some variables the database, gives a very limited amount of information. For instance, concerning the nationality requirement for board of directors, the database only indicates whether a restriction is applied or not. It does not give details on the importance of the restriction. Third, because the information has been collected through a survey, and in spite of several checks, it is prone to bias and misunderstandings.¹² For instance, the answers of France and Australia relating to the maximum ownership refer to requirements to fly the national flag and not the establishment of foreign firms. This example shows the importance when studying services to accumulate knowledge on the characteristics and particularities of a sector in terms of functioning, regulations, etc.

Box 5: Barriers to trade—discriminatory and behind the border barriers to trade.

In services sectors many behind the border regulations (i.e. non-discriminatory barriers affecting domestic as well as foreign providers) are applied—mainly to correct market failures. Since discriminatory and non-discriminatory regulations have different objectives and impacts on the sector’s efficiency, it is important not to mix them in the same index.

As mentioned in Table 3, concerning barriers to investment, only the license requirement could be discriminatory. On the one hand, when it is non-discriminatory, licensing aims at ensuring that carriers that enter the market are reliable (in terms of security and safety for instance) and solvent. On the other hand, the limited information availability does not enable to know whether the

¹² For OECD economies, the information was publicly available. data has been collected through desk studies. However, this approach does not prevent bias and misunderstandings.

requirement is discriminatory or not and the degree of restriction of this variable. Hence, I do not include the license requirement in my liner shipping STRI that is a “pure” discriminatory index.

In spite of the great interest of the World Bank database, it is important to use the raw data very cautiously. Hence, as a basis, I used the data for three variables contained in the database. Then, I checked and cross-checked the regulatory information contained in the database through two main sources (APEC Individual Action Plans and WTO Trade Policy Reviews, various years) and discussions with experts, professionals and administrations.¹³

Finally, considering the difficulties expose above, three restrictions are included in the index: limitation to foreign ownership, restrictions on the form of the commercial presence and screening and approval process. My index has the advantage to include the most relevant barriers to trade in international shipping and strong regulatory information.

3.2. Scoring

Scoring, consists in assigning a numerical value to qualitative information; the more trade-restricting is a measure, the more the score assigned is high.¹⁴ For matters of interpretation and transparency it is advisable to choose the same scoring scheme for all restrictions/variables (OECD, 2009). However, among the restrictions considered in the STRI, one is continuous (i.e. ownership limitations) while others are discrete. Considering our dataset, a continuous scoring scheme is not appropriate. In order to minimize the loss of information and to preserve the variation in the data, the continuous variable is transformed into multiple binary scores through specific thresholds based on economic justifications. The first threshold is set on the [0.99; 0.50] interval. It represents a joint venture requirement based on the fact that this restriction is likely to discourage foreigners to invest in the sector. The second threshold is set on the [0.49; 0] interval based on the fact that 50% represents the majority control of a firm.

3.3. Weighting and aggregation

In order to aggregate scores, a weighting scheme and an aggregation method have to be chosen. The weighting scheme captures the relative importance of restrictions in terms of trade restrictiveness. In

¹³ With an exception for Hong Kong and Singapore that are not reported in the World Bank database. For these two leading maritime economies, the regulatory information comes from APEC (various years) and WTO (various years).

¹⁴ Scores are normalized on a 0 to 1 scale. This scale has been chosen arbitrarily and does not affect the results of the index.

order to determine weights I explore two options generally used in the literature. The first solution consists in using an equal weighting scheme. This method offers the advantage of being transparent. However, equal weights do not reflect the potential restrictiveness of each category. The second alternative is to use the factor analysis methodology and most particularly the Principal Component Analysis (PCA). PCA is a statistical method. It determines weights according to the categories' contribution to the entire variance of the sample. The first step of a PCA is to determine the number of latent factors (also called eigenvalues) representing the most important part of the sample's variance.¹⁵ The second step, consists in computing loadings (i.e. the principal components, also called eigenvectors) representing the correlation between index's components and latent factors. The third step is to produce weights, normalizing eigenvectors to one. This methodology has two major drawbacks. First, weights will depend on the sample and could not be used in a future analysis with different economies. Second, it assigns largest weights to variables that are responsible for the largest part of the variance. In other words, weights determined through a PCA do not necessarily reflect the real degree of categories' restrictiveness. Considering the feasibility and the advantages and drawbacks of the two methodologies presented, I decided to use an equal weighting scheme.¹⁶

The following step consists in the aggregation of the categories. Again, for a question of transparency and interpretation, I choose a linear method of aggregation.

Table 4: The international liner shipping STRI

Measures	Weights (w)	Scoring (s _i)		
Form of the ownership (Greenfield)	1/3	Branch and subsid. allowed 0	Only subsidiary or branch allowed 0.5	Green. project not allowed 1
% of ownership in Greenfield project	1/3	100% 0	99-50% (JV requirement) 0.5	Less than 50% 1
Screening and approval	1/3	No screening and approval 0		Screening and approval 1
Country score (0-6)		Σws_i		

Notes: For each variable the first line corresponds to aspects taken by restrictions in economies. The second line corresponds to scores.

3.4. Robustness check

To conclude, I check the robustness of the STRI. One drawback when using a composite index to measure trade restrictiveness is the subjectivity of the weighting methodology. Indeed, the weighting scheme affects final scores. Therefore, I test the sensitivity of results to choices that have been made concerning the weighting scheme. I check if the ranking of economies is driven by a particular

¹⁵ In order to determine relevant latent factors I use two thumb rules: the Kaiser criterion (eigenvalues below one are dropped) and the variance explained criteria (latent factors must explain more than 70% of the entire variance) (OECD, 2008)

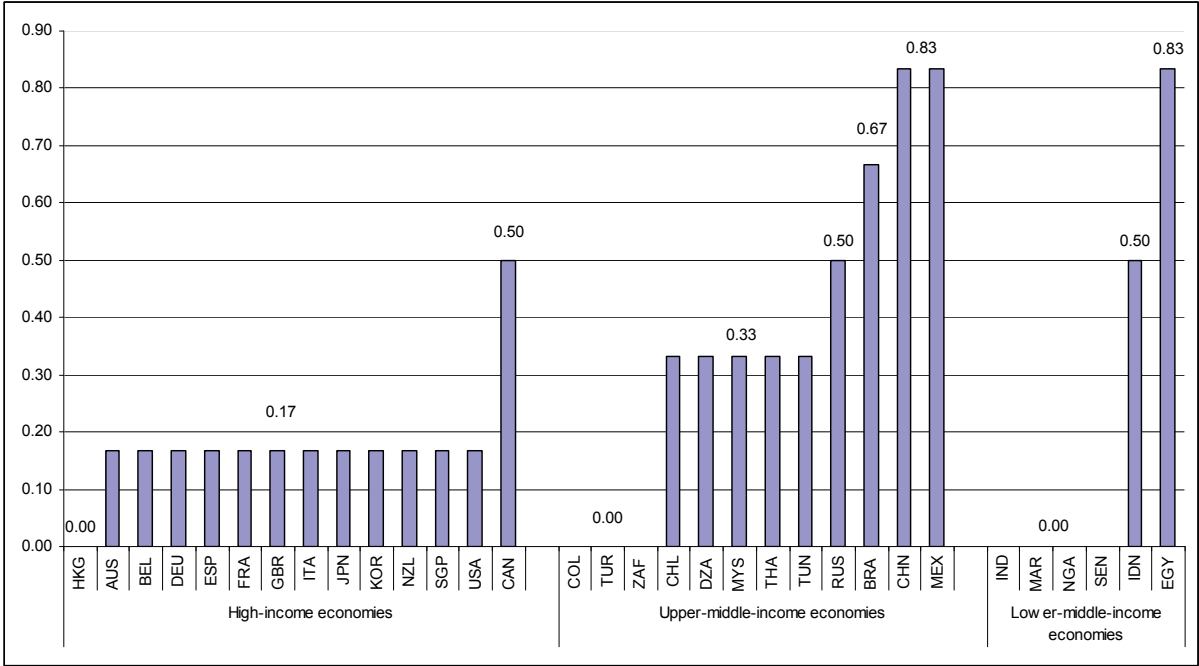
¹⁶ The results of the PCA are not reported to conserve space but they are available upon request—they will be important for the robustness check, notably.

weighting scheme by using the Spearman rank correlation methodology. I calculate the Spearman rank correlation for the STRIs calculated through the equal and PCA weighting scheme. Finally, the result of the robustness check enables to confirm that the ranking of economies are strongly robust to the weighting scheme.¹⁷

4. Results

The index ranges from 0 to 0.83—1 is the maximum possible score. The median of the index is 0.167, the average 0.26 and the standard deviation 0.254. At first sight, the level of openness of the liner shipping sector in mode 3 is not easily explainable. Indeed, the most liberal investment regimes are applied by upper- and lower-middle income economies such as Colombia, Turkey, South Africa, India, Morocco, Nigeria and Senegal while the score of developed economies such as European Union (EU) economies, Australia and Japan is close to the median (Figure 1).

Figure 1: The liner shipping Services Trade Restrictiveness Index (STRI)



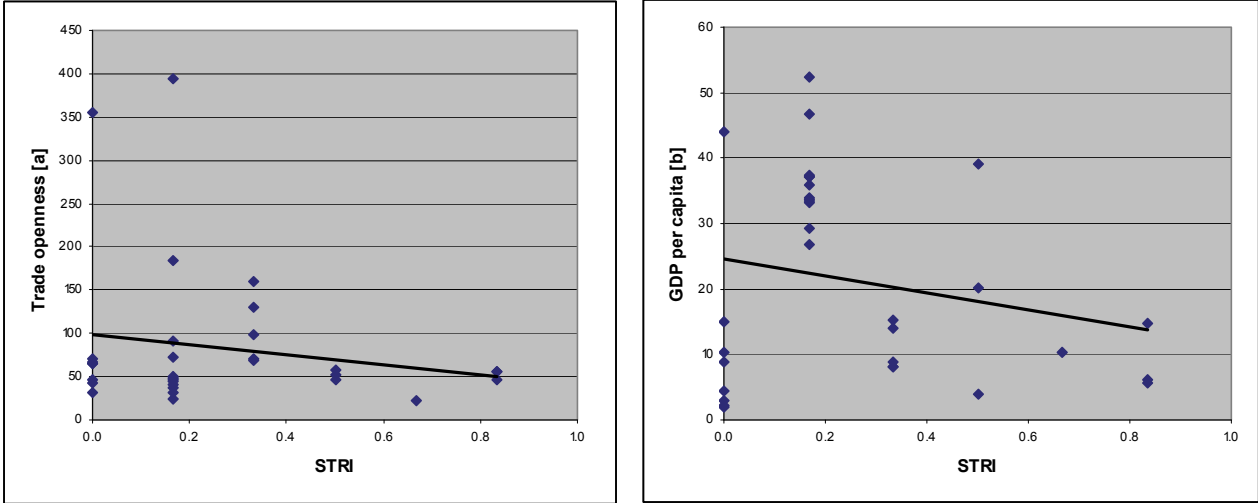
Sources: Author’s calculation. Notes: Economies are identified by 3-digit ISO economy codes. A score of 0 corresponds to a fully-opened liner shipping sector. In contrast, a score of 1 corresponds to a closed sector. High-income economies (Growth National Income—GNI—per capita of 12276 dollars or more), upper-middle-income economies (GNI per capita between 3976 and 12275 dollars), lower-middle-income economies (GNI per capita between 1006 and 3975 dollars) and low-income economies (GNI per capita of 1005 dollars or less).

However, simple correlations give some clues on the determinants of the degree of openness of the sector. Thus, economies with high level of Gross Domestic Product (GDP) per capita and trade

¹⁷ Spearman's rho = 0.9982.

openness are associated with low scores. In other words, the richer and the more open to international trade is a economy, the more this economy will be opened to foreign investment in liner shipping (Figure 2).

Figure 2: Services Trade Restrictiveness Index (STRI) scatter plots



Sources: Author’s calculation and World Bank (2012b). Notes: [a] Trade openness: merchandise trade in percent of GDP. [b] GDP per capita in Purchasing Power Parity (PPP) in current international dollars.

5. Conclusion

As a conclusion, in this paper I provide an original index measuring the overall intensity of barriers to investment existing in the liner shipping sector. This new index is based on discussions and exchanges with experts and professionals in order to avoid misinterpretations and bias. This is a first contribution of the index. Additionally, in contrast to the two previous attempts by McGuire *et al.* (2000) and Li and Cheng (2007), my index is constructed using state of the art methodologies developed by the OECD (OECD, 2008). Furthermore, I also used high quality information on the regulatory regime effectively applied by economies.

The construction, computation and description of the liner shipping STRI is not a final objective but rather a first step. The STRI is a powerful tool that has to be included in extensive quantitative analysis in order to investigate various issues. Thus, it could be used as a dependant variable to measure the determinants of the policy. More interesting, it could be used as an explanatory variable to investigate the impact of barriers to investment on the sector’s efficiency—e.g. freight rates. Such works would fill a gap existing in the literature. Indeed, while many papers measure the determinants of freight rates, the impact of international shipping trade regulations has not been fully investigated. Only one article addresses this issue and it focuses on cross-border restrictions (Fink *et al.*, 2002). Hence, the original STRI is helpful to provide more detailed and extensive analysis on this crucial issue.

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