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Firm Level Analysis of Trade Restrictions in the Maritime Port Services Industry

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Abstract

This paper examines competition and profitability in the port services sector using data from the OECD's Services Trade Restrictiveness Index (STRI) and Orbis. It is part of an ongoing series in the Services Division of the Office of Industries examining firm profitability and barriers to entry in the services sector. The paper begins with an overview of the maritime port services industry, describing industry structure, regulation, and competition. It then discusses how trade restrictions in the maritime cargo-handling segment affect the competitive landscape and, ultimately, the profitability of firms that provide port services. The paper includes a quantitative analysis of the relationship between these factors using the OECD STRI scores for logistics-related cargo handling services, as a proxy for port services, and Orbis-generated firm-level profitability data for cargo-handling firms. The analysis indicates the degree to which high entry barriers in the port services sector lead to less competition and higher profits among cargo handling firms in the maritime sector. The paper concludes with recommendations for future areas of research on competition in port services.

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Abbreviations and Acronyms

Acronym	Term
CMA-CGM	Compagnie Maritime d'Affrètement and Compagnie Générale Maritime
COSCO	China Ocean Shipping Company
CSP	COSCO Shipping Ports
GDP	Gross domestic product
GTO	Global terminal operator
EBITDA	Earnings before interest, tax, depreciation, and amortization
ITO	International terminal operator
NACE	Nomenclature statistique des activités économiques dans la Communauté européenne (Statistical Classification of Economic Activities in the European Community)
NAICS	North American Industry Classification System
NTM	Non-tariff measure
OECD	Organisation for Economic Co-operation and Development
SOE	State-owned enterprise
STRI	Services Trade Restrictiveness Index
TIL	Terminal Investment Limited
UNCTAD	United Nations Conference on Trade and Development

Introduction

This paper examines competition and profitability in the port services sector using data from Orbis, a commercial database that contains financial and ownership information on firms from a large sample of countries, and the OECD's STRI, a measure of barriers to services trade by country and industry. Previous papers on this topic have focused on barriers to entry in the banking, insurance, and telecommunications services. In banking services, for example, it was found that banks in countries with low levels of trade restrictions had significantly higher profits than banks in countries with no restrictions. At the same time, foreign-owned firms were more profitable than domestic firms in countries where there were no restrictions on the entry and operation of the former. The findings suggest that, to the extent to which trade barriers inhibit market competition—in part, by impeding the entry of foreign services providers—such circumstances may lead to higher profitability among existing domestic firms. Conversely, domestic firms may experience lower profitability when competition from foreign firms is facilitated by the absence or removal of trade restrictions.[1]

The paper extends previous analysis on banking, insurance, and telecommunications services firms to the port services sector by looking at the relationship between services trade policies and firm-level profitability among maritime cargo handling firms. The analysis suggests that an increase in the level of services trade restrictions increases profitability among cargo handling firms, whether they are independently owned or subsidiaries of large firms.

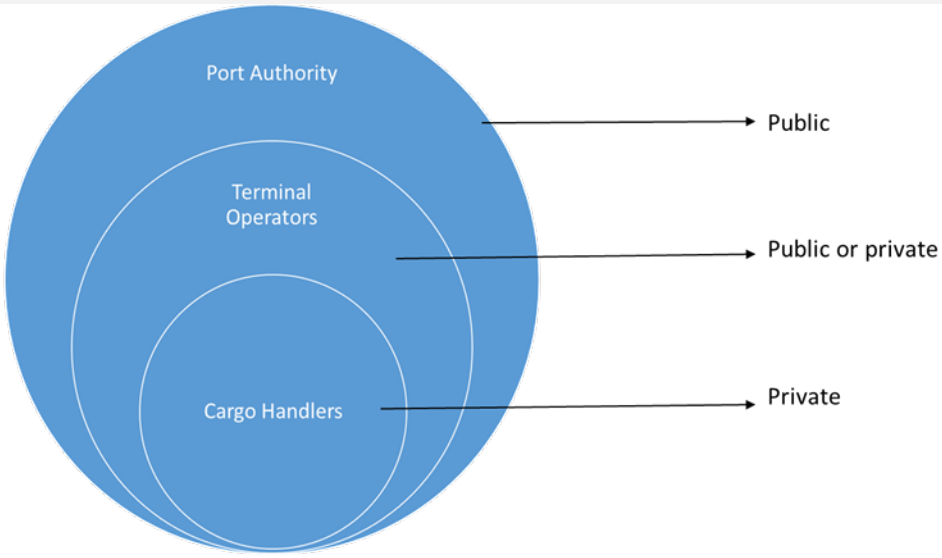
Overview of the Port Services Industry

Structure of the Industry

For the purposes of this paper, the maritime port services industry encompasses all activities that pertain to the loading, unloading, warehousing, storage, and transfer of cargo from ships to road and rail connections.[2] In general, the port services sector comprises three principal categories of participants: the port authority, terminal operators, and private sector firms that supply discrete services at the port, including cargo handling (figure 1).[3]

[1] Oliver, "Do Non-Tariff Measures Make Domestic Firms More Profitable? Evidence from the Commercial Banking Sector," U.S. International Trade Commission (USITC), Office of Industries, Working Paper ID-047, December 2017.
[2] More than 80 percent of the volume and 70 percent of the value of worldwide merchandise trade is transported by sea. Therefore, maritime ports are critical actors in global supply chains. UNCTAD, *Review of Maritime Transport*, 2017, x; and OECD, *Aid for Trade at a Glance*, Chapter 3, "Digital Connectivity and Trade Logistics," 88.
[3] Although a number of ancillary services are provided by either the port authority or private firms, including ship repair, navigation assistance, and traffic management, this paper will focus on firms that provide cargo handling services. World Bank, *Port Reform Toolkit, Module 3*, 2007, 81.

Figure 1 Primary participants in the port services sector



Source: Compiled by USITC staff.

At the highest level is the port authority, which, in most countries, is a public sector entity.[4] The port authority owns the land and basic infrastructure connected with the port and has administrative oversight of the port's commercial activities.[5] Below the port authority is the terminal operator. Terminal operators are generally private firms that receive long-term concessions from the port authority to build port infrastructure, such as landside cranes, warehouses, and container stations, as well as to maintain and operate these equipment and facilities under the terms of concession agreements.[6] Concessions may permit private firms to build other facilities at the port, including water channels, quay walls, and terminal complexes. Private firms may also serve as port operators, as well as sublease terminals and other facilities to third parties. However, private port operators do not have regulatory oversight of maritime matters at the port and, at the end of their concession terms, they must relinquish port assets to port authorities.[7]

[4] The most common type of port authority is a local port authority, which has jurisdiction over a particular port area such as, for example, the Port Authority of New York and New Jersey. World Bank, *Port Reform Toolkit, Module 3*, 2007, 77.

[5] As noted, the terms "infrastructure" and "superstructure" are often used in relation to maritime ports. Infrastructure includes the port harbor, the wharf, quays, piers, jetties, docks and any other structures that permit a ship to enter a port. The port superstructure refers to the equipment and facilities that enable the port to conduct commercial activities, and includes terminals, cranes, warehousing and storage facilities, trucks, and rail links, among other things. The superstructure of a port is built by private firms, including terminal operators that use the port under concessions granted by the port authority. World Bank, *Port Reform Toolkit, Module 3*, 2007, 95.

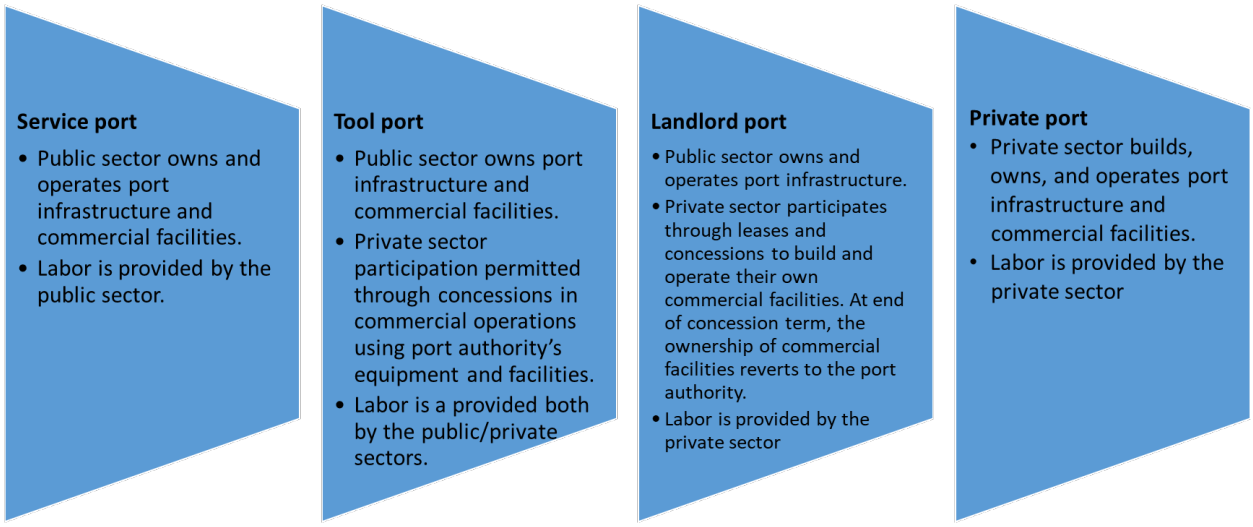
[6] In concession agreements, the port authority may specify a minimum level of cargo volume that must be processed by cargo handling firms. UNCTAD, *Review of Maritime Transport*, 2017, 73.

[7] Maritime matters may include those pertaining to safety and environmental concerns. World Bank, *Port Reform Toolkit, Module 3*, 2007, 117.

Port Ownership

There are four primary models for port ownership. Broadly, these are known as the service port, the tool port, the landlord port, and the fully privatized port (figure 2).

Figure 2 Four models of port governance



Source: Compiled by USITC staff.

Service ports are primarily public sector entities. The port authority owns and operates the land, infrastructure, equipment and facilities at the port and supplies port services, including cargo handling. Similarly, the tool port includes substantial public sector investment and ownership, with the port authority responsible for the development and operation of port infrastructure, as well as the port's commercial equipment and facilities related to cargo handling (i.e., quays, cranes, and warehouses). However, in the tool port model, commercial activities, including cargo handling, are conducted by private sector firms under contract with shipping lines. Competition among cargo handlers at tool ports may be limited if they are required to use port-owned equipment to perform activities.[8] Further along the spectrum is the landlord port, the predominant form of port ownership in most countries, including the United States.[9] Under the landlord port model, the port authority owns the land surrounding the port, which is then leased or offered through concession to private terminal operators. These firms, in turn, develop the commercial facilities at the port—such as cranes, warehouses, and container freight stations—and are responsible for providing cargo handling and other landside services. In addition, the port authority is generally responsible for regulating economic activity at the port,[10] as well as matters related to maritime safety and security in port operations and compliance with environmental

[8] In some cases, the port authority of a tool port may permit private sector cargo handling firms to use their own equipment, thereby eliminating potential conflict among multiple providers and extending the model of a tool port to a landlord port. World Bank, *Port Reform Toolkit, Module*, 2007, 82.
[9] Landlord ports account for between 85 and 90 percent of global ports, and between 65 and 70 percent of global container throughput. UNCTAD, *Review of Maritime Transport*, 2017, 73.
[10] At times, an independent port regulator is established to ensure the absence of "practices intended to restrict, distort, or prevent competition." World Bank, *Port Reform Toolkit, Module 3*, 2007, 89.

standards.[11] Finally, in fully-privatized ports, private entities build, own, and/or operate all the port infrastructure and equipment, and conduct port-related activities. This model is relatively uncommon but notable especially in New Zealand and the United Kingdom (UK).[12]

Terminal Ownership

Although nearly all port authorities are government-owned, the ownership of individual terminals at ports varies. In particular, terminal owners generally consist of a mixture of large shipping lines; global and international terminal operators (GTOs/ITOs); and, in some cases, public sector entities (table 1).

Table 1 Top global terminal operators by share of volume of containerized cargo, 2017

Rank	Company	Country	Volume (million TEUs)	Share (% of total TEUs)
1	China Cosco Shipping	China	91.3	12.2
2	Hutchison Ports	China	82.3	11.0
3	APM Terminals	Netherlands	76.3	10.2
4	PSA International	Singapore	73.9	9.9
5	DP World	UAE	68.7	9.2
6	TIL (Terminal Investment Limited)	Netherlands	44.0	5.9
7	China Merchants Ports	China	31.0	4.2
8	CMA CGM[a]	France	24.8	3.3
9	Eurogate	EU	13.8	1.9
10	SSA Marine[b]	United States	11.3	1.5
		Total	517.3	69.4
		Grand total	745.5	

Source: Asia/Middle East Maritime Focus, "APL's Acquisition by CMA CGM a 'Happy Coincidence'," November 21, 2016; Drewry, *Global Container Terminal Operators Annual Review and Forecast: Annual Report 2017*, 2017, 3 and 104; and Drewry representative, email correspondence with USITC staff, September 20, 2018.
Notes: [a] In 2016, CMA CGM (France) acquired maritime firm, APL (Singapore), which owns container shipping and terminal operations.
[b] SSA Marine replaced Hanjin (Korea) as the 10th largest global terminal operator after the latter filed for bankruptcy on August 31, 2016.

First, in some cases, terminal operators are affiliated with large container shipping lines whose core function is maritime freight transport (i.e., "liner-affiliated terminals"). Such operators include, for instance, APM Terminals (Netherlands), a subsidiary of the AP Moller Group (Denmark), COSCO Shipping Ports (CSP), Ltd. (China), a subsidiary of China COSCO Shipping, and Evergreen (Taiwan).[13] These firms own and operate dedicated container terminals to support their global shipping networks.[14] However, the business model for firms like APM Terminals and CSP has shifted in recent years, so that they

[11] World Bank, *Port Reform Toolkit, Module 3*, 2007, 80–81 and 104.; and UNCTAD, *Review of Maritime Transport*, 2017, "Box 4.2: Alternative port management structures and ownership models," 74.

[12] World Bank, *Port Reform Toolkit, Module 3*, 2007, 83. For further discussion of port privatization in New Zealand and the UK, see USITC, *Recent Trends in U.S. Services Trade*, 2015, "Box 4.1: A Snapshot of maritime port reform," 85.

[13] Equity shares in individual port terminals may be divided among multiple firms, including between shipping lines, global terminal operators, and government entities. Drewry, *Global Container Terminal Operators Annual Review and Forecast: Annual Report 2017*, "Table 3.1: Global/International Operators' Terminal Throughput League Table, 2015-16," 16.

[14] APM and COSCO are two examples of terminal operators that provide cargo handling services to third-party shipping lines. By contrast, shipping firm Evergreen operates terminals exclusively for its own use. In some cases, shipping lines, terminal operators, and cargo handlers are vertically integrated. Sayler, Brian, "Stevedoring and Marine Cargo Handling in the US," IBISWorld Industry Report 48832, December 2017, 21.

increasingly provide services to third-party shipping lines. Second, terminals may be owned and managed by GTOs/ITOs whose core function is terminal management rather than maritime transport.[15] Prominent examples of these firms include DP World (UAE), Hutchison Port Holdings (China), and PSA (Singapore). All three firms operate terminals as profit centers and provide services to third parties. Third, in some countries, particularly China, a majority of terminals are built, owned, and operated by government entities.[16] This would be the case in the aforementioned service ports, in which the port authority oversees all aspects of port development and operation.[17]

Cargo Handling Firms

Service providers, including cargo-handling firms, are primarily private sector firms that operate under contract with terminal operators to provide discrete services to shipping lines.[18] In general, cargo handlers provide a range of services to shipping firms. These services include, for example, guiding the entry of a ship into a water channel at a port and assisting with its mooring at a quay, unloading a ship's cargo and transferring it to warehouses or other storage facilities, and conveying such cargo from warehouses to trucks or rail connections at the port for delivery to inland destinations. Other services supplied by cargo handling firms include customs inspection and the preparation of containerized cargo for further processing.[19]

As noted, cargo handlers operate under contract with terminal operators. In recent years, terminal operators have increasingly automated the labor-intensive movement of marine cargo through use of computer technology. In particular, software programs enable cargo handlers to schedule the loading and unloading of cargo from ships and to automate the movement of cranes for such activity,[20] as well as for the transfer of cargo to inland storage facilities and road and rail connections.[21] The automation of port activities related to containerized cargo may include, among other things, the use of driverless cargo-handling equipment and guided vehicles at the port, as well as the deployment of automated cranes for stacking containers. Such automation reduces the number of longshore workers needed to operate vehicles and cargo-handling equipment at terminals, and may reduce costs and enhance productivity at the port.[22]

While technology has improved productivity in the ports sector, it is unclear to what extent cargo-handling firms' profitability are driven by productivity gains. In ports where cargo-handling firms are

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[15] Global container terminal operators "lease, buy and develop containers terminals and operate them for profit. This is an important departure from the model where a port authority balances profit with competing priorities for local, regional, and national economic benefit." Theofanis, et. al, "Trends in Global Port Operations and Their Influence on Port Labor," submitted for presentation at the 50th Annual Transportation Research Forum, March 16–18, 2009, Portland, Oregon, 7.

[16] DP World (UAE) and PSA (Singapore) are state-owned entities, but they operate as commercial interests. Drewry, *Global Container Terminal Operators Annual Review and Forecast*, 12.

[17] World Bank, *Port Reform Toolkit, Module 3*, 2007, 82.

[18] World Bank, *Port Reform Toolkit, Module 3*, 2007, 81.

[19] Meersman, et. al, "Port Competition Revisited," in *Review of Business and Economics*, vol. 2, 2010, 212.

[20] Cargo from container ships is typically unloaded using quay cranes (cranes that are affixed to the dock) rather than cranes that are on board a vessel. Theofanis, Sortiris, et. al, "Trends in Global Port Operations and Their Influence on Port Labor," submitted for presentation at the 50th Annual Transportation Research Forum, March 16–18, 2009, Portland, Oregon, 7.

[21] Mongelluzzo, "Cargo Tech Seen Cutting Costs, Boosting Productivity," *Journal of Commerce*, December 18, 2017.

[22] Varghese, "In the Middle of Trade War, America's Busiest Port Gets Ready for Robots," *Bloomberg*, May 20, 2019.

government-owned or where shipping lines use dedicated terminals, competition may be limited by high entry barriers in the industry, allowing firms to retain more profits even in the absence of rising productivity. Further, labor issues may also dampen productivity gains and profitability in the sector. The advent of containerization and the use of computers has shifted the balance of power from longshoremen to terminal management and stevedoring firms.[23] Fewer longshoremen are needed to plan, oversee, and conduct the movement of cargo between ships and ports, and such work has had to adapt to technological change, including the use of computer programs to determine when and how many longshoremen are needed to unload a vessel.[24] Longshore workers, many of whom are unionized,[25] have sought to preserve their roles by imposing requirements on the handling of containerized cargo and its transfer to trucks and rail cars or have created physical areas at the port, within which cargo may only be handled by unionized labor.[26]

Industry Regulation and Competition

As mentioned, the most prevalent model for port ownership is the landlord port model, in which the port authority owns the land and port infrastructure, and commercial activities at the port, including terminal operation, are carried out by private sector firms. Under this model, the port authority, which itself is connected to a local, regional, or national government, serves as the industry regulator.[27] The regulatory function of the port authority largely concerns maritime safety and security, and adherence to environmental standards related to maritime activity.[28] However, in countries where the port authority also performs commercial activities at the port, there may be direct competition between private sector and port-affiliated cargo handlers, placing the former at a competitive disadvantage.[29] This may be the case, for example, under the tool port model, where the port has substantial ownership of commercial facilities at the port, but nonetheless permits private sector participation in port activities.[30]

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[23] Theofanis, Sortiris, et. al, "Trends in Global Port Operations and Their Influence on Port Labor," submitted for presentation at the 50th Annual Transportation Research Forum, March 16–18, 2009, Portland, Oregon, 5 and 7.

[24] Theofanis, Sortiris, et. al, "Trends in Global Port Operations and Their Influence on Port Labor," submitted for presentation at the 50th Annual Transportation Research Forum, March 16–18, 2009, Portland, Oregon, 5 and 7; and JOC Port Performance North America Conference, "With Labor Peace Secured, Will Productivity Gains Follow?" panel discussion, December 12, 2018, Newark, New Jersey.

[25] Theofanis, Sortiris, et. al, "Trends in Global Port Operations and Their Influence on Port Labor," submitted for presentation at the 50th Annual Transportation Research Forum, March 16–18, 2009, Portland, Oregon, 5 and 7–9. In some cases, non-unionized rather than unionized labor may be employed to reduce the costs of port operations. Typically, union contracts for longshore workers outline general work conditions, including the number of workers within a particular work unit, or gang; the level of pay; the duration of work shifts and break time; and the amount of paid leave.

[26] Theofanis, Sortiris, et. al, "Trends in Global Port Operations and Their Influence on Port Labor," submitted for presentation at the 50th Annual Transportation Research Forum, March 16–18, 2009, Portland, Oregon, 10; and World Bank, *Port Reform Toolkit, Module 2*, 2007, 56.

[27] World Bank, *Port Reform Toolkit, Module 3*, 2007, 77.

[28] The separation of the commercial and regulatory functions of a government-affiliated port authority are necessary to promote competition among port services providers. World Bank, *Port Reform Toolkit, Module 3*, 72 and 75.

[29] OECD, "STRI Sector Brief: Maritime Freight Transport Services," December 2018, 2.

[30] World Bank, *Port Reform Toolkit, Module 3*, 72 and 75.

Port Competition

There are two primary types of competition in the port services industry: inter-port and intra-port competition. Inter-port competition generally occurs between ports in the same geographic area, including ports that compete for transshipment cargo (i.e., cargo that is transferred from its point of origin to its point of destination through a third location). Factors influencing inter-port competition include the geographic location of the port, the frequency of shipping services to the port, the type of infrastructure available at the port (such as its capacity for handling large volumes or certain types of cargo), and the port's reputation, or ranking, in terms of efficiency and productivity.[31] Intra-port competition may occur between terminal operators in the same port and between different providers of the same services within a terminal, such as cargo handlers.[32]

In general, the most competitive cargo handling firms (i.e., in terms of acquiring and serving customers) are often the most profitable. These firms demonstrate high productivity, which results from employing highly skilled, specialized labor and their efficient use of port assets, including port-related technology.[33] However, where there exists a government-affiliated monopoly provider of cargo handling services, or where the number of cargo handling firms is otherwise limited to a few providers, profits may accrue to these firms in the form of "rents" and may not necessarily be indicative of high productivity.[34]

The OECD's Services Trade Restrictiveness Index (STRI) on Cargo Handling

The OECD's STRI on logistics-related cargo handling includes three distinct categories of services—cargo handling services; freight forwarding services; and storage and warehousing services.[35] The regulatory framework for these subsectors is different, and therefore the OECD has developed separate STRI indices for each of them. For the purposes of this paper, we use only the OECD STRI that pertains to cargo handling services (ISIC 5224).[36] The ISIC 5224 category corresponds to the NACE 5224 category used to extract data from Orbis.[37]

Separately, the OECD places NTMs in the port services sector in five broad categories. These are restrictions on foreign entry; barriers to competition; regulatory transparency; restrictions on the movement of people; and other discriminatory measures. Within these categories, the STRI identifies

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[31] Meersman, et. al, "Port Competition Revisited," in *Review of Business and Economics*, vol. 2, 2010, 217.
[32] De Langen and Pallis, "Analysis of the Benefits of Intra-Port Competition," 7. Also published in the International Journal of Transport Economics, Vol. 33, No. 1, February 2006, 69–85. https://www.jstor.org/stable/42747779?seq=1#page_scan_tab_contents(accessed October 26, 2018).
[33] World Bank, *Port Reform Toolkit, Module 3*, 2007, 77.
[34] De Langen and Pallis, "Analysis of the Benefits of Intra-Port Competition," 7. Also published in the International Journal of Transport Economics, Vol. 33, No. 1, February 2006, 69–85. https://www.jstor.org/stable/42747779?seq=1#page_scan_tab_contents (accessed October 26, 2018).
[35] Cargo handling services correspond to International Standard Industrial Classification (ISIC) code 5224; freight agency and customs brokerage services (ISIC 5229), and storage and warehousing services, including customs warehouse services (ISIC 5210). See UN, *International Standard Industrial Classification of All Economic Activities (ISIC), Revision 4*, 2008, 199–201.
[36] OECD, Services Trade Restrictiveness Index Simulator: Logistics Cargo Handling, n.d. (accessed March 25, 2019); and OECD, "STRI Sector Brief: Logistics Services," December 2018, 2.
[37] Eurostat, "RAMON Correspondence Tables," (accessed May 2, 2019).

barriers to competition and restrictions on foreign entry as among the most prevalent across countries. Barriers to competition include measures concerning the granting by the port authority of statutory monopolies for the provision of port activities, and the port authority's cross-subsidization of its competitive activities with profits from its non-competitive activities (appendix 1).[38] As noted, measures concerning competition are addressed by the establishment of an independent port regulator that is not engaged in the commercial operations of the port.[39] Separately, barriers to foreign entry pertain to equity restrictions on foreign firms that invest in port and terminal operations and the use of quotas and economic needs tests to limit foreign participation in port activities.[40]

Overall, roughly 70 percent of the NTMs identified in the OECD's STRI on cargo handling services are discriminatory barriers, or barriers that affect participation by foreign but not domestic cargo handling firms.[41] Of these, nearly 90 percent of measures under the STRI category "restrictions on foreign entry" are discriminatory.[42] Such measures include restrictions on legal form for foreign firms providing cargo-handling services, requirements for the majority of members of boards of directors to be nationals or residents, and the use of screening mechanisms for foreign investment in cargo handling, among others. Non-discriminatory measures in this category reserve the provision of cargo-handling services to the statutory monopoly, thereby prohibiting competition from either domestic or foreign cargo handling firms.[43]

Regulatory measures in the STRI category "barriers to competition" may be especially significant, as they denote the absence of "pro-competitive" policies for regulating the sector.[44] Only 7 percent of NTMs under barriers to competition are discriminatory barriers, with the remaining 93 percent of such measures affecting both domestic and foreign firms alike.[45] Non-discriminatory measures that inhibit competition in cargo handling include those that permit publicly controlled firms to be exempt from general competition law, impose minimum capital requirements on new entrants in the sector, and regulate prices and fees. Other non-discriminatory measures identified under barriers to competition include lack of accounting separation; the cross-subsidization of competitive activities with profits from non-competitive activities; a prohibition on the supply of cargo-handling services to third parties; and the absence of a competitive bidding process to award contracts for services provision.[46]

Apart from restrictions on foreign entry and barriers to competition, the STRI on cargo handling services also contains measures on the movement of people, regulatory transparency, and other discriminatory measures. Restrictions on the movement of people affect foreign firms, and generally prohibit or limit the number of foreign services suppliers in a particular market. By comparison, measures on regulatory transparency are non-discriminatory and concern administrative, legal, and business practices that lack clarity or are sufficiently burdensome as to constitute impediments to trade. Within this category, customs measures may have a particular impact on cargo handling firms. Customs NTMs include the absence of single windows for submitting customs documentation; the absence of mechanisms to

[38] OECD, "STRI Sector Brief: Logistics Services," December 2018, 2.
[39] World Bank, *Port Reform Toolkit, Module 3*, 2007, 89.
[40] OECD, "STRI Sector Brief: Logistics Services," December 2018, 3.
[41] USITC staff calculations.
[42] USITC staff calculations.
[43] OECD, STRI, Logistics Services. OECD STRI. OECD, "STRI Sector Brief: Logistics Services," December 2018, 2.
[44] Nordås and Rouzet, "The Impact of Services Trade Restrictiveness on Trade Flows: First Estimates," *OECD Trade Policy Papers* No. 178, February 2015, 12.
[45] USITC staff calculations.
[46] OECD, "STRI Sector Brief: Logistics Services," December 2018, 2–3.

process customs paperwork prior to the arrival of cargo; the lack of separation of the release of goods from the payment of customs duties; and the absence of a de minimis regime (i.e., a monetary threshold below which customs duties and fees are not required).[47] Finally, other discriminatory measures include preferences given to local suppliers for cargo handling services; the less favorable treatment of foreign suppliers with respect to taxes and subsidies compared to domestic suppliers; and minimum thresholds for tenders regarding cargo-handling concessions, among other measures.

Econometric Analysis

Literature Review

While previous literature on the relationship between services trade barriers and firm profitability typically featured a two-stage regression model, more recent papers have used a single stage estimation method to assess the effects of NTMs on services trade in several industries. Fontagné and Mitaritonna (2012) focused on distribution and telecom services in 11 emerging markets and found that increased restrictiveness had a negative impact on profitability.[48] Additional work by Khachaturian (2015), Khachaturian and Oliver (2016), and Oliver (2017) followed the same method. Both Khachaturian and Oliver (2016) and Oliver (2017) provide overviews of the evolution of this methodology and recent work on estimating the effects of NTMs on firm performance.[49]

Few papers address the cargo handling industry specifically, but Rouzet and Spinelli (2016) include cargo handling among several industries in an analysis using a single-stage model to estimate the relationship between firm-level profit margins and the OECD's STRI. Their methodology includes controls for firm level characteristics such as size and productivity, but uses a general measurement (GDP) to account for market demand. The paper finds that cargo handling firms in countries with more restrictions are able to generate higher profits, and that foreign-owned cargo handling firms in countries with high levels of restrictions experience lower profits than domestically-owned firms (although the latter relationship is not found to be statistically significant).[50]

Nordas and Rouzet (2016) also examine the impact of the STRI on services trade in cargo handling services, among others, using a gravity model approach with PPML estimators. Although not specifically focused on firm profitability, the paper finds that for maritime transport services (which includes cargo handling services), a higher STRI score is associated with lower imports. This indicates that more restrictive regulations raise the costs of doing business for foreign suppliers, including the cost of market entry.

Therefore, building on previous work, this paper separates the impact of the aforementioned NTMs by including additional firm-level characteristics. In particular, the analysis in the papers is designed to (1)

[47] OECD, "STRI Sector Brief: Logistics Services," December 2018, 2–3.; Nordås and Rouzet, "The Impact of Services Trade Restrictiveness on Trade Flows: First Estimates," *OECD Trade Policy Papers* No. 178, February 2015, 6.
[48] Fontagné and Mitaritonna, "Assessing Barriers to Trade in the Distribution and Telecom Sectors in Emerging Countries," 2012.
[49] Khachaturian, "Services Trade Restrictions and Company Profits: Telecommunications," USITC, Office of Industries, 2015; Khachaturian and Oliver "Firm Level Analysis of Services Trade Restrictions in the Life Insurance Industry," USITC, Office of Industries, 2016; and Oliver, "Do Non-Tariff Measures Make Domestic Firms More Profitable? Evidence from the Commercial Banking Sector," USITC, Office of Industries, December 2017.
[50] Rouzet and Spinelli, "Services Trade Restrictiveness, Mark-Ups and Competition," 2016.

evaluate the difference between the performance of firms that are subsidiaries of larger parent firms from those that are independently-owned and (2) controls for the effects of cargo handling firms that also may be engaged in non-cargo handling activities. In addition, this paper builds on previous work that separates the impact of NTMs on foreign- and domestic-owned firms.

Data and Methodology

To measure profitability and productivity at the firm level in the cargo-handling sector, this paper uses data for 2016 from Bureau van Dijk's Orbis database.[51] The sample includes all firms listed in the Statistical Classification of Economic Activities in the European Community (NACE) 5224, cargo handling that have financial data available for 2016.[52] Orbis reports official company financial data that is not restricted by country; however, the availability of such information varies across countries according to country-specific reporting requirements. For example, U.S. regulations do not require privately held companies to report financial information, while regulations in many Asian and European countries do. Therefore, Orbis may have more detailed information on private companies for firms located in Asia and Europe than for firms in the United States. The lack of public financial data may be a particular problem for the cargo-handling sector, in which many small firms operate.

Data gathered from Orbis were also cleaned manually to eliminate firms in other industries that were improperly coded.[53] Firms whose industry descriptions did not match the activities of a firm engaged in cargo handling were removed from the sample. Additionally, firms primarily engaged in non-maritime cargo handling were removed from the sample. For example, firms whose company description mentioned air transport, aviation, construction, freight forwarding, and land transport were eliminated. This was done so that the current analysis more closely matched the OECD's STRI for cargo handling, which focuses only on cargo handling for maritime freight transport.[54] Two highly profitable Chinese firms were also excluded from the sample, as they seem to derive the bulk of their revenue from non-cargo handling related activities, despite being active in the maritime ports sector.[55]

Orbis also contains information on firms' ownership, making it possible to distinguish between independent firms and subsidiary firms (i.e., firms that are more than 50-percent owned by a parent

[51] The data were downloaded on February 20, 2019.

[52] NACE 5224 is analogous to the North American Industrial Classification System (NAICS) 4883. NACE 5224 comprises cargo handling for water, land, and air transport, while NAICS 4883 contains support activities for water transportation, and also includes non-cargo handling activities. To better correspond to the OECD STRI's sectoral definition for cargo handling services, the paper uses NACE 5224 rather than NAICS 4883.

[53] Orbis data on cargo handling firms in the maritime ports sector was cleaned by eliminating: (1) entries with firm-level descriptions that do not appear related to maritime activity (i.e., such as those containing the words "air," "aviation", "construction," "land," and "rail"); (2) entries in which firms are identified as holding companies; and (3) entries with no descriptions of firm-level activity. Firm-level data with the following terms used in the company description were retained: cargo, container, harbor, wharf, quay, terminal, port, handling, cranes, load, unload, warehousing, storage, dock, stevedoring.

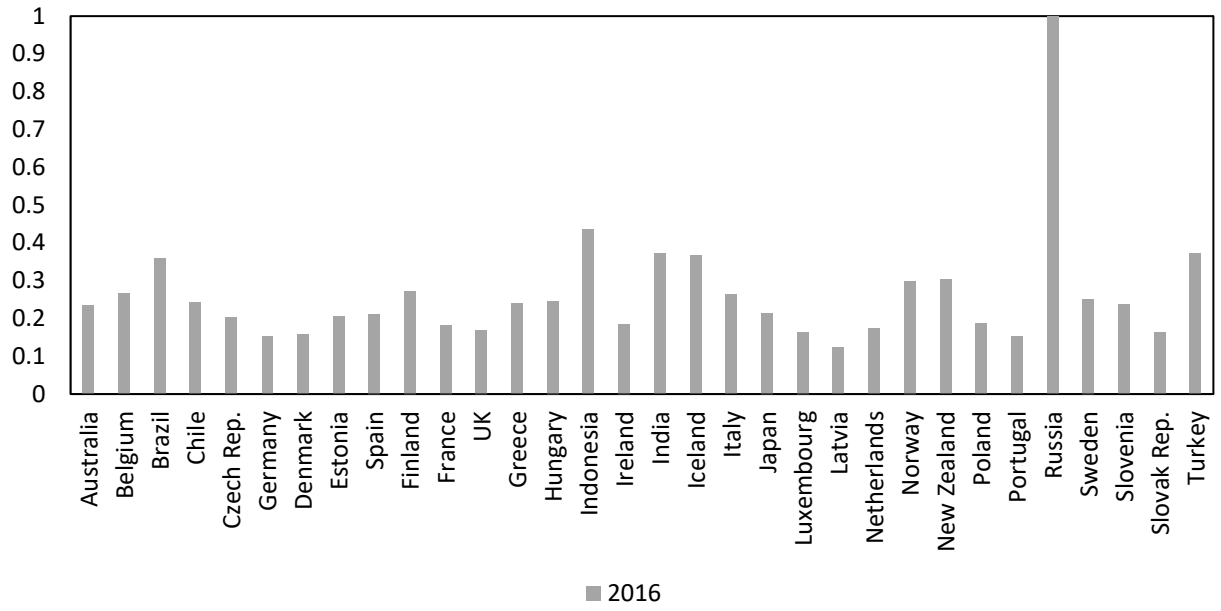
[54] OECD, email correspondence with USITC staff, August 13, 2018.

[55] These two firms, Shanghai International Port (Group) Company Limited and Maysun Supply Chain Management Company Limited, had an average EBITDA (earnings before interest, tax, depreciation and amortization) of $953 million in 2017.

company).[56] Orbis also provides information on the location of a firm's global ultimate owner, which Orbis defines as a firm that owns at least 50 percent of another firm (either directly or through another subsidiary).[57] This allows a firm to be classified as an independent firm, a domestically-owned subsidiary, or a foreign-owned subsidiary. It also identifies the location of a firm's global parent.

To measure the level of restrictiveness on cargo handling services, this paper uses the OECD's STRI. As noted, the OECD measures the severity of NTMs in five broad categories: restrictions on foreign entry, restrictions to movement of persons, other discriminatory measures, barriers to competition, and regulatory transparency.[58] The STRI ranges from 0 to 1, with a score of 0 being the least restrictive, and 1 being the most restrictive. Appendix 1 lists the policy measures that compose the STRI for marine cargo handling. Of the 32 countries in the sample, only Russia has a score of 1,[59] whereas all other countries range from 0.12 to 0.43 (figure 3).

Figure 3 STRI scores for cargo handling, by country, 2016

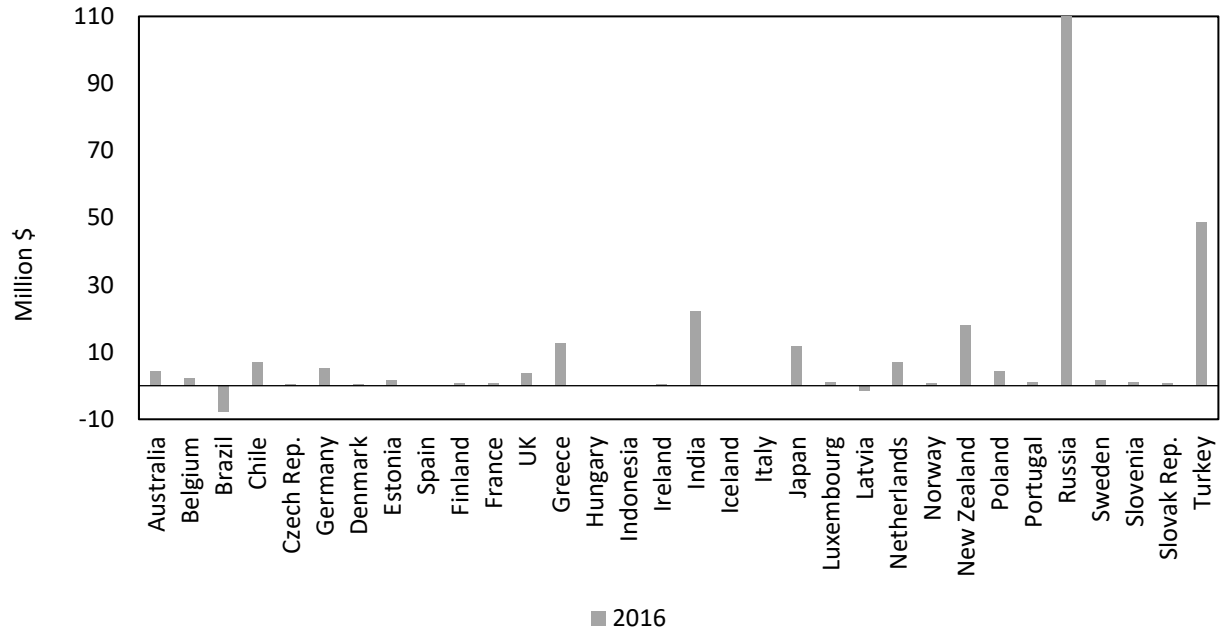


Source: OECD, "Services Trade Restrictiveness Index," (accessed February 20, 2019).
Note: The countries included in this chart are those included in the analysis, i.e. those that appear both in the Orbis sample and the STRI database. For example, no U.S. cargo handling firms reported profitability data in Orbis in 2016 and are thus not captured in the sample. Chinese cargo handling firms to report profitability data in Orbis but were excluded from the sample during data cleaning due to high reported EBITDA likely derived from non-cargo handling activities.

[56] Orbis assigns firms a letter grade depending on their level of independence. "A" denotes firms that do not have individual shareholders with more than 25 percent direct or total ownership; "B" denotes firms that do not have more than 50 percent direct or total ownership; and "D" denotes a single external shareholder with more than 50 percent direct ownership. Bureau van Dijk, "Orbis Data Guide," 2007, 125.
[57] Bureau van Dijk. "Ultimate Owner Identification," ORBIS User Guide, last updated February 2019 (accessed April 1, 2019).
[58] OECD, "Services Trade Restrictiveness Index," (accessed February 20, 2019).
[59] Although Russia permits 100 percent foreign ownership in its cargo handling sector, it maintains state-owned monopolies in several cargo handling sub-sectors, as well as other barriers to competition, including lack of regulatory transparency.

Combining the STRI with the firm-level data from Orbis yields 3,276 firms in 32 markets in 2016.[60] Appendix 2 lists the countries in the sample by level of STRI restrictions, and includes the number of observations that include firm-level financial data per country. Figure 4 shows the average firm profitability by country, as measured by EBITDA. It is important to note that some companies are SMEs and some have negative profits. Two countries in the sample, Brazil and Latvia, display negative average profits.[61] Conversely, Russia and Turkey display average profits per firm much higher than other countries in the sample.

Figure 4 Average EBITDA by country, cargo-handling firms, 2016 (million $)



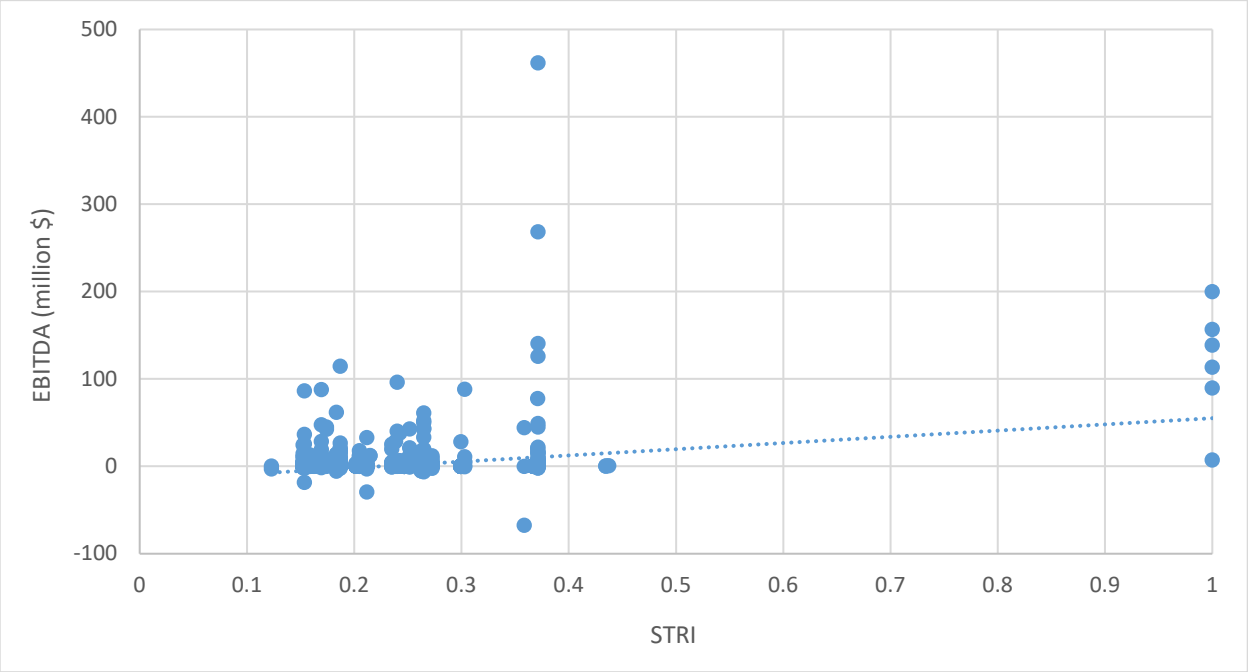
Source: Author's calculations based on data from Bureau van Dijk, Orbis Database (accessed February 20, 2019).
Note: All countries included in the sample have at least two firms reporting profitability data. Brazilian and Latvian firms both experienced negative profitability, on average, in the last two to three years of the sample.

The relationship between EBITDA and the STRI for cargo handling firms is shown in figure 5 and figure 6. Since most countries have STRI scores of less than 0.4, variation is somewhat limited. Additionally, most cargo-handling firms have profits as measured by EBITDA below $100 million, though several outlying firms with profits in excess of this are present in the data. There is a linear relationship between the two variables, as illustrated in figure 5, although the correlation is somewhat weak (0.124), while figure 6 shows that firms in countries with an STRI above 0.4 have significantly higher average profits than firms in countries with lower STRI scores.

[60] A representative from the OECD stated that, in compiling the STRI for logistics-related cargo-handling services, the OECD used NACE 5224 (support activities for transportation, cargo handling), yielding approximately 4,900 firm observations for the period 2012–14. OECD representative, email correspondence with USITC staff, August 13, 2018. The year chosen for this analysis (2016), additional data cleaning performed for this analysis, as well as firm exit and changes in Orbis coverage over time, may be reasons for the smaller overall number of firms in the sample used in this paper.

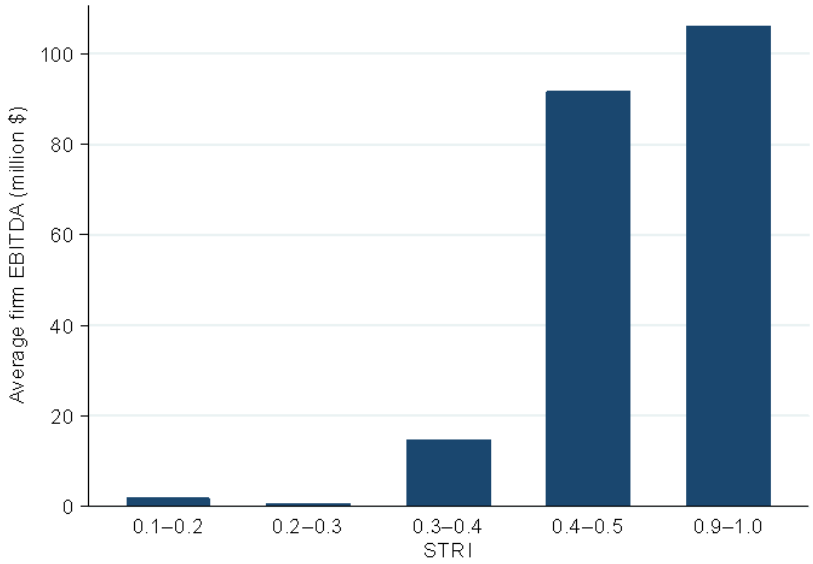
[61] Due to the negative profitability of some firms in the sample, it is problematic to estimate the model using a log-log specification. Thus, this specification is not presented in this paper, though it was used as a robustness check.

Figure 5 EBITDA and STRI, by firm, 2016



Source: Author's calculations based on data from Bureau van Dijk, Orbis Database (accessed February 20, 2019) and OECD, "Services Trade Restrictiveness Index," (accessed February 20, 2019).

Figure 6 EBITDA and STRI, by STRI category, 2016



Source: Author's calculations based on data from Bureau van Dijk, Orbis Database (accessed February 20, 2019) and OECD, "Services Trade Restrictiveness Index," (accessed February 20, 2019).

The methodological approach used in this paper relates firm-level profit margins to the STRI for logistics cargo handling, along with country characteristics (and firm characteristics in some specifications). While some prior work used a two-stage model in order to control for both firm and country-level determinants of profitability, this study follows Khachaturian (2015), Rouzet and Spinelli (2015), and Oliver (2017) by clustering standard errors at the country level to combine firm and country-level data in a single regression. The model also takes advantage of the OECD's recent updates to the STRI to increase country coverage, which also extends the universe of firms that can be included in the analysis.

Equation 1 is the basis for empirical estimations to examine the impact of the STRI on firm profitability. The main policy variable is the OECD's STRI, and the dependent variable is firm profitability (measured by EBITDA). The subscript *i* indicates the firm dimension, and *c* the country dimension. Two variables are also included to control for variation in market size across countries. *LnPopulation* measures the log of the population of each country by year, and *MerchGDP* controls for the value of a country's merchandise trade as percent of a country's GDP, as this may indicate higher demand for cargo handling services.[62]

$$(1)\ EBITDA_i = \beta_1 + \beta_2 STRI_c + \beta_4 MerchGDP_c + \beta_5 lnPopulation_c + + \varepsilon_{ic}$$

Equation 2 maintains the same variables as equation 1 but adds a term that controls for whether a firm is listed as having a secondary NAICS code that is not in the 4883 (support activities for water transportation) category,[63] which indicates activity outside the cargo-handling sector. These activities may contribute to the firm's profitability, but are not measured by the STRI for cargo handling used as the policy variable.

$$(2)\ EBITDA_i = \beta_1 + \beta_2 STRI_c + \beta_3 MerchGDP_c + \beta_4 lnPopulation_c + \beta_5 SecondaryNAICS_i + \varepsilon_{ic}$$

Equation 3 also keeps the same variables as equation 1 but separates the sample into firms that are direct subsidiaries of other firms and those that are independently owned (*Subsidiary* equals 1 when a firm's Orbis independence indicator specifies that more than 50 percent of the firm is owned by another firm). This is done to examine the possibility that cargo-handling firms may be under pressure from parent companies, such as shipping firms, to forgo higher profitability by giving their parent firms favorable rates even when shielded from competition. *Equation 3* also adds an interaction term between *STRI* and *Subsidiary* to measure any impact of services trade restrictions on firms that are controlled by a parent company (either foreign or domestic).

$$(3)\ EBITDA_i = \beta_1 + \beta_2 STRI_c + \beta_3 MerchGDP_c + \beta_4 lnPopulation_c + Subsidiary_i + \beta_5 STRI * Subsidiary_i + \varepsilon_{ic}$$

Equation 4 adds to *equation 3* by separating the sample into foreign- and domestically-owned cargo handling firms. Foreign-owned firms are by necessity subsidiaries, whereas domestic firms may be either independently owned or subsidiaries of other domestic entities. This equation also adds labor productivity (calculated as total revenue divided by total employment for a given firm in a given year) as

[62] Other control variables, such as GDP per capita, also were considered. Ultimately, the variable pertaining to merchandise trade as percent of a country's GDP was deemed the best indicator of the demand for cargo handling services.

[63] NAICS 4883 (support activities for water transportation) is analogous to NACE 5224. See footnote 52 for more detail.

a firm-level control to examine if foreign affiliates are more productive than their domestic counterparts and whether this accounts for any observed differences in profitability.

$$(4)\ EBITDA_i = \beta_1 + \beta_2 STRI_c + \beta_3 MerchGDP_c + \beta_4 lnPopulation_c + \beta_5 Foreignowned_i + \beta_6 STRI * Foreignowned_i + \beta_6 LaborProductivity_i + \varepsilon_{ic}$$

Results

Regression results are presented in table 3. Column (1) shows results for specification (1) which relates the level of restrictiveness to firm profitability. The model results suggest that moving from an STRI of zero (completely unrestricted) to an STRI of 1 (completely restricted) raises average firm profitability in the cargo handling sector by almost $70 million, though this is only significant at the 10 percent level.[64] More concretely, the model suggests that firms in a country moving from an STRI of 0.2 to 0.3 would see their average profits increase by $6.9 million. These results are consistent with the findings of Rouzet and Spinelli (2015) for the cargo-handling sector, and provide support for the hypothesis that increased restrictions on services trade are associated with higher firm profits due to decreased competition, even when non-cargo handling firms and other outliers with extremely high EBITDA are removed from the sample.

The regression specification in column (2) tests for the possibility that cargo handling firms are also engaged in non-cargo handling activities that account for a high degree of their profitability by including a dummy variable indicating if the firm has a secondary NAICS indicating non-cargo handling activity. However, controlling for this factor, the STRI variable maintains the same sign, and about the same level of significance and magnitude as it has in the specification in column (1), and its relationship to firm profitability appears consistent.

The specification presented in column (3) examines whether increased levels of services trade restrictiveness affect firms that are subsidiaries of parent companies (either foreign or domestic) differently than independent firms. This estimation indicates that while firms that are subsidiaries are less profitable than independent cargo handling firms overall (significant at the 5 percent level), the interaction between the *STRI* and *Subsidiary* variables indicates that subsidiaries operating in more restrictive markets are still associated with higher profitability (also significant at the 5 percent level), much like their independent counterparts. This provides some support for the theory that parent firms of cargo handlers, such as shipping companies, may not allow their subsidiaries to pass on the full costs (including mark ups) to their customers. It also indicates that these subsidiaries are still able to increase their profitability when operating in a less competitive environment. The magnitude of the coefficient on the interaction term is actually larger than the magnitude of the coefficient on the STRI term alone, indicating that cargo-handling subsidiaries may experience higher profits in less competitive environments than independently-owned firms.[65]

Finally, column (4) presents a specification that examines the relationship between services trade restrictions and profitability on foreign-owned firms compared to domestically-owned firms. In contrast

[64] The p-value is 0.068.

[65] When competition is restricted, parent firms may allow their subsidiaries to pass on higher mark ups to their customers. It could also be the case that countries with more restrictions in cargo handling generally have more restrictions, and thus less competition, in maritime shipping (or another sector where the parent company operates). In this way, the effects of STRI scores on the profitability of firms in different industries may be related through cross-industry parent-subsidiary relationships.

to column (3), absent restrictions, firms which are foreign-owned exhibit increased profitability overall, while the interaction between foreign ownership and STRI (statistically significant at the 5 percent level) indicates that the profitability of foreign-owned cargo handling firms declines as services trade restrictiveness increases when compared to domestic firms. This provides support for the idea that the STRI is capturing the discriminatory nature of barriers to services trade. This result is also robust when including labor productivity at the firm level as a control, though increased labor productivity may be only one channel through which foreign-owned firms are able to increase their profitability absent restrictions that inhibit competition.[66]

Table 2 Regression Results

	(1)	(2)	(3)	(4)
Dependent variable	EBITDA (million $)	EBITDA (million $)	EBITDA (million $)	EBITDA (million $)
STRI	69.024*	72.393**	33.822*	87.820**
	(36.442)	(35.797)	(19.846)	(36.916)
Merchandise trade % GDP	0.0136	-0.009	0.017	0.021*
	(0.0168)	(0.017)	(0.016)	(0.012)
Ln Population	0.737	0.723	1.262	0.737
	(0.889)	(0.845)	(0.930)	(0.756)
Secondary NAICS		-3.535		
		(2.105)		
Subsidiary			-10.533**	
			(3.989)	
STRI*Subsidiary			59.681***	
			(21.028)	
Foreign-owned				20.312**
				(9.313)
STRI*Foreign-owned				-86.939**
				(38.925)
Labor Productivity[a]				0.000***
				(0.000)
Constant	-29.121*	-25.697	-31.149**	-33.873*
	(16.741)	(15.337)	(16.646)	(17.444)
Observations[b]	3,726	3,276	3,276	2,571
Adjusted R squared	0.087	0.096	0.122	0.147
Countries in sample	32	32	32	31

Source: Author's estimates.
Note: *** p<0.01, ** p<0.05, * p<0.1. Clustered standard errors in brackets.
[a] The coefficient for labor productivity was non-zero but extremely small.
[b] The use of additional firm-level financial data to calculate variables, such as labor productivity, reduces the number of firms in the sample by a large degree, indicative of many firms with incomplete data in the sample. The addition of a control variable for firm size had a similar effect on sample size. However, using firm size as a control in the regressions does not alter the significance of the results or meaningfully change the size of the effects.

In order to understand the relationship between the STRI and the profitability of subsidiaries and foreign-owned firms, table 4 combines the regression coefficients of individual dummy variables to show the overall effect of the STRI on both subsidiaries (1) and foreign firms (2). The impact of the STRI on subsidiary firms is higher than on non-subsidiary firms, suggesting that as restrictions increase, subsidiaries are able to increase their profitability more than non-subsidiaries. However the opposite

[66] Results are not significant for the first three specifications when labor productivity is introduced as a control for the full sample.

case is observed for foreign-owned firms compared to their domestically-owned counterparts. Increasing restrictions have a positive effect on the profitability of domestically-owned firms but a negative effect on foreign-owned firms. Since foreign-owned firms are necessarily subsidiaries, this provides support for the idea that the STRI is measuring discriminatory treatment of foreign firms, and not only other barriers to competition that affect all subsidiary firms equally.

Table 3 Combined regression coefficients by subsidiary status and ownership category

		Non-subsidiary	Subsidiary	Domestic-owned	Foreign-owned
(1)	STRI	33.822*	49.149***		
		(19.846)	(17.245)		
(2)	STRI			87.820**	-66.627**
				(36.916)	(29.697)

Source: Author's estimates.
Note: *** p<0.01, ** p<0.05, * p<0.1. Robust standard errors in brackets.

To check the robustness of these results, regressions were estimated excluding several outliers as well as including Chinese firms with extremely high profits that were eliminated from the original sample. When Chinese firms were included in the sample, the STRI variable was significant at the 5-percent level in the first three specifications (compared to the 10-percent level in table 3), though the STRI variable was not significant for specification 4. However, in the interest of producing conservative estimates of the relationship between services trade restrictiveness and profitability, these firms were not included in the final results. When Russia is excluded from the sample, due to its high STRI, results were similar to those in table 3 for specification 1 and 3, with the STRI variable significant at the 10-percent level, though the STRI variable was not significant for specification 2 and 4.[67] This suggests that, while the overall relationship between the STRI and average firm profitability is robust across countries, certain results may be driven by the inclusion of outlier countries in the sample and care should be taken when selecting a sample and cleaning data. Similarly, when using a log-linear regression specification (and accounting for firms with negative profitability), results are also not significant. This would seem to indicate that results are being driven by extreme variation in profitability among a few firms, which the log transformation reduces. All four specifications were also tested using labor productivity as the dependent variable, to examine whether services trade restrictiveness might also have an impact on firm productivity. In this case, the results were not significant.

Conclusion

This paper examines competition and profitability in the port services sector using data from Orbis and the OECD's STRI, extending previous analysis on banking, insurance, and telecommunications services. The analysis suggests that non-tariff measures (NTMs), as measured by the OECD's STRI, have a negative impact on the profitability of cargo-handling firms. Relative to cargo-handling firms in countries with lower levels of NTMs, firms in countries with higher levels of restrictions are significantly more profitable. In addition, firms that are subsidiaries of larger enterprises are able to increase their profitability, when operating in a less competitive (or more restrictive) environment, relative to independent firms. This may indicate that, when cargo-handling firms are subsidiaries of larger enterprises, such as shipping companies, they are restricted by their owners in their ability to increase the markup on their services and pass these markups on to their customers. Furthermore, the

[67] Conversely, Italian firms make up a large portion of the sample (2,094 of the 3,276 firms). When Italian cargo-handling firms are excluded, the results are significant for all specifications at higher levels than those reported in table 3.

profitability of foreign-owned firms decreases as restrictions on services trade increase. However, this latter result may be partly driven by the inclusion of a small number of highly profitable firms in countries that have high STRIs.[68] Future work on the impact of STRIs in the cargo-handling sector may expand the sample size, and may also include estimates of the effect of STRIs on firm productivity.

[68] Due to the potential for different results based on sample size and composition, it is important to note the significance of data cleaning and outlier analysis when estimating the impact of services trade restrictions on firm profitability.

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Appendix 1 STRI measures on logistics cargo handling services

	Discriminatory	Non-discriminatory
A. Restrictions on Foreign Entry		
Foreign equity restrictions: maximum foreign equity share allowed (cargo-handling)	●	
There are limits to the proportion of shares that can be acquired by foreign investors in publicly-controlled firms (cargo-handling air)	●	
There are limits to the proportion of shares that can be acquired by foreign investors in publicly-controlled firms (cargo-handling at ports)	●	
There are limits to the proportion of shares that can be acquired by foreign investors in publicly-controlled firms (cargo-handling at road facilities)	●	
There are limits to the proportion of shares that can be acquired by foreign investors in publicly-controlled firms (cargo-handling at rail facilities)	●	
Legal form: only joint ventures are allowed (cargo-handling)	●	
Legal form: other restrictions (cargo-handling)	●	
Board of directors: majority must be nationals (cargo-handling)	●	
Board of directors: majority must be residents (cargo-handling)	●	
Board of directors: at least one must be national (cargo-handling)	●	
Board of directors: at least one must be resident (cargo-handling)	●	
Managers must be national (cargo-handling)	●	
Managers must be resident (cargo-handling)	●	
Screening explicitly considers economic interests	●	
Screening exists without exclusion of economic interests	●	
Memo: thresholds for screening projects	●	
Acquisition and use of land and real estate by foreigners is restricted	●	
Restrictions on the type of shares or bonds held by foreign investors	●	
Conditions on subsequent transfer of capital and investments	●	
Restrictions on cross-border mergers and acquisitions (M&A)	●	
Performance requirements		●
Service provision is reserved for statutory monopoly or granted on an exclusive basis (cargo-handling at airports)		●
Service provision is reserved for statutory monopoly or granted on an exclusive basis (cargo-handling at ports)		●
Service provision is reserved for statutory monopoly or granted on an exclusive basis (cargo-handling at road facilities)		●
Service provision is reserved for statutory monopoly or granted on an exclusive basis (cargo-handling at rail facilities)	●	
Market share under monopoly in the sector (value between 0 and 1, e.g. for 50% enter 0.5)	●	
Licenses are subject to quotas or economic needs test (cargo-handling)	●	
License/authorization is required to enter the market (cargo-handling)	●	
Cross-border data flows: free transfer of personal data or application of the accountability principle	●	
Memo: Cross-border data flows: transfer is possible only when certain private sector safeguards are in place	●	
Cross-border data flows: transfer is possible only to countries with substantially similar privacy protection laws or consent by government authority	●	

	Discriminatory	Non-discriminatory
Cross-border data flows: fulfilling a combination of conditions is required before transfer is possible	●	
Cross-border data flows: transfer of personal data is prohibited	●	
Other restrictions on foreign entry	●	
B. Restrictions on the Movement of People		
Quotas: intra-corporate transferees	●	
Quotas: contractual services suppliers	●	
Quotas: independent services suppliers	●	
Labor market tests: intra-corporate transferees	●	
Labor market tests: contractual services suppliers	●	
Labor market tests: independent services suppliers	●	
Limitation on duration of stay for intra-corporate transferees (months)	●	
Limitation on duration of stay for contractual services suppliers (months)	●	
Limitation on duration of stay for independent services suppliers (months)	●	
Other restrictions to movement of people	●	
C. Other Discriminatory Measures		
Foreign suppliers are treated less favorably regarding taxes and eligibility to subsidies	●	
Public procurement: Explicit preferences for local suppliers (cargo-handling)	●	
Public procurement: Procurement regulation explicitly prohibits discrimination of foreign suppliers (cargo-handling)	●	
Public procurement: The procurement process affects the conditions of competition in favor of local firms (cargo-handling)	●	
Memo: thresholds above which tender is mandated (cargo-handling)	●	
National standards on transport packages deviate from international standards		●
Other restrictions in other discriminatory measures	●	
D. Barriers to Competition		
Decisions by the regulatory body can be appealed	●	
Firms have redress when business practices restrict competition in a given market	●	
National, state or provincial government control at least one major firm in the sector (cargo-handling at airports)		●
National, state or provincial government control at least one major firm in the sector (cargo-handling at ports)		●
National, state or provincial government control at least one major firm in the sector (cargo-handling at road facilities)		●
National, state or provincial government control at least one major firm in the sector (cargo-handling at rail facilities)		●
Publicly-controlled firms are exempted from the application of the general competition law (cargo-handling at airports)		●
Publicly-controlled firms are exempted from the application of the general competition law (cargo-handling at ports)		●
Publicly-controlled firms are exempted from the application of the general competition law (cargo-handling at road facilities)		●

	Discriminatory	Non-discriminatory
Publicly-controlled firms are exempted from the application of the		
Prices or fees are regulated (cargo-handling)		●
Minimum capital requirements (cargo-handling)		
Restrictions on advertising (cargo-handling)		●
Separation of accounts is required (cargo-handling at airports)		
Separation of accounts is required (cargo-handling at ports)		●
Separation of accounts is required (cargo-handling at rail facilities)		
Cross-subsidization is prohibited (cargo-handling at airports)		●
Cross-subsidization is prohibited (cargo-handling at ports)		
Cross-subsidization is prohibited (cargo-handling at rail facilities)		●
Self-handling is prohibited (cargo-handling at airports)		
Self-handling is prohibited (cargo-handling at ports)		●
Service provision to third parties is prohibited (cargo-handling)		
Contracts for service provision are awarded through competitive bidding (cargo-handling at airports)		●
bidding (cargo-handling at ports)		
Absence of an airport facility (air)		●
Absence of a road facility (road)		●
Other restrictions in barriers to competition		●
E. Regulatory Transparency		
There is a legal obligation to communicate regulations to the public within a reasonable time prior to entry into force	●	
There is an adequate public comment procedure open to interested		
Range of visa processing time (days)	●	
Cost to obtain a business visa (USD)	●	
Number of documents needed to obtain a business visa		
Duration of visa for crew: number of months allowed by the visa: aircrew	●	
Duration of visa for crew: number of months allowed by the visa: truck drivers	●	
Visas on arrival or visa exemption are available for temporary entry/transit of crew: seamen	●	
Visas on arrival or visa exemption are available for temporary		
Multiple entry visas are allowed for crew: aircrew	●	
Multiple entry visas are allowed for crew: truck drivers	●	
Number of working days to complete all mandatory procedures to register a company		

	Discriminatory	Non-discriminatory
Total cost to complete all official procedures required to register a company (in % of income per capita)	●	
Number of mandatory procedures to register a company	●	
Individual licensing/registration requirements are imposed on warehousing, freight forwarding and customs brokerage services	●	
Time taken for customs clearance (days)	●	
An advance ruling system is available	●	
A single window for customs procedures is available	●	
Pre-arrival processing is possible	●	
A de minimis regime is in place: Import duties (USD)	●	
Memo: a de minimis regime is in place: Internal tax (USD)	●	
The release of goods is possible before determination and payment of duties	●	
Other restrictions in regulatory transparency	●	

Source: Compiled by USITC staff from OECD, Services Trade Restrictiveness Index Simulator: Logistics Cargo Handling, n.d. (accessed March 25, 2019).

Appendix 2 Number of firm observations and STRI, by country

Country	Number of observations	STRI
Australia	14	0.23
Belgium	294	0.26
Brazil	3	0.36
Chile	7	0.24
Czech Republic	18	0.20
Germany	32	0.15
Denmark	25	0.16
Estonia	32	0.20
Spain	261	0.21
Finland	70	0.27
France	226	0.18
UK	70	0.17
Greece	11	0.24
Hungary	126	0.25
Indonesia	2	0.43
Ireland	16	0.19
India	57	0.37
Iceland	15	0.37
Italy	1,595	0.26
Japan	2	0.21
Luxembourg	3	0.16
Latvia	2	0.12
Netherlands	19	0.17
Norway	37	0.30
New Zealand	6	0.30
Poland	71	0.19
Portugal	86	0.15
Russian Federation	6	1.00
Sweden	117	0.25
Slovenia	28	0.24
Slovakia	23	0.16
Turkey	2	0.37
Total	3,276	

Source: Compiled by staff based on data from Bureau van Dijk, Orbis Database (accessed February 20, 2019); OECD, "Services Trade Restrictiveness Index," (accessed February 20, 2019).