"International trade is growing faster than the global economy – and most trade continues to be seaborne. Orders may be placed electronically, but the actual movement of the goods still requires ports and ships. Maritime logistics is thus evermore important for any country’s development. Understanding contemporary shipping and port management is vital for businesses and policy-makers in leading their companies and countries. Written and edited by some of the world’s most renowned maritime economists, this new edition of Maritime Logistics is both timely and important.”

Jan Hoffmann, Chief, Trade Facilitation Section, UNCTAD, and President, International Association of Maritime Economists

“It is only occasionally that a book of this quality becomes available. Essential reading for all those with an interest in logistics. Comprehensive, up to date and perceptive.”
Professor Michael Roe, Chair in Maritime and Logistics Policy, Plymouth Business School

“A real tour de force in its comprehensive coverage of the shipping and port industries.”
Professor Kevin Cullinane, Professor of Logistics and Transport Economics, University of Gothenburg

At the cutting edge in its assessment of the industry, Maritime Logistics covers the whole scope of the subject and examines the latest logistical developments within the port and shipping industries. This new edition has been thoroughly revised and updated, with a range of new international contributors and new chapters on portcentric logistics, hinterland logistics, global supply chains, maritime transport and future trends and developments.

Written by a team of experienced international experts, Maritime Logistics provides a fully global perspective. The book covers everything that students and those working within the industry need to know about maritime logistics. As well as providing comprehensive guidance on shipping lines, containers, tankers, dry bulk and portcentric logistics, this edition examines the latest logistical developments within the port and shipping industry.

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Introduction

In the last decade, international trade agreements and regional trade integration initiatives have significantly reduced the tariff-based barriers to trade. Substantial barriers to trade remain, however. These remaining barriers are often termed ‘non-tariff barriers’. In many bilateral and multilateral negotiations, attempts are also made to reduce these barriers, but this turns out to be much more difficult than reducing import and other tariffs. The reason for this is that a number of these so-called non-tariff barriers are closely related to, or caused by, the main conduit of international trade, namely logistics and international transportation, and the non-fiscal government supervision in the international movement of goods.

Ocean transportation has always been connected with trade. This relationship goes back hundreds, perhaps thousands, of years. During the period of the great explorations of the world, trading and transport was always one operation. This practice continues, with the large trading houses in the world – Glencore, Cargill, Vitol, Trafigura, ADM, Noble Group, Louis Dreyfus, Bunge and some lesser known (but not smaller) companies such as Koch, Gunvar, Mercuria, Wilmar International, Arcadia, Mabanaft – controlling a large part of the world bulk fleet, mainly through long-term and short-term charter contracts.

In the mid-19th century, however, ocean shipping also became a business activity on its own. The advent of the steam engine brought reliability and predictability far beyond what sailing vessels could offer. This separation of shipping and trade, however, brought a host of new challenges. One that is still debated to this day is the exemption of cartel legislation for liner
shipping that originates from the beginning of the 20th century. In Europe and the USA, these exemptions have only recently been abolished.\textsuperscript{1}

Another topic that has been hotly debated among maritime economists is the way in which shipping and ports facilitate trade. Perhaps the biggest supporter of this idea was United Nations Conference for Trade and Development (UNCTAD). This United Nations initiative started in 1964 with the ambition to change global trade by providing the poorer countries with an independent role in trade and in transportation (Taylor and Smith, 2007). Its golden years were the 1960s and 1970s, when, among others, the Code of Conduct for Liner Conferences saw the light (see, for instance, Neff, 1980 or Sturmey, 1986). This Code of Conduct was a typical instrument to (re-)forge the link between trade and transport: one of the provisions said that transport companies from two trading countries should be allowed to carry equal parts of the trade and leave a limited trade volume to be carried by third parties. This idea later became known as the 40/40/20 rule. The implied result of this rule was that any trading country should thus form its own transport capacity, in order to carry the allotted 40 per cent of its own trade.

Trade facilitation has developed from a narrow idea about the possibility to move goods between countries through ports to a much more extensive concept, encompassing the general trade environment in countries and between countries (Wilson \textit{et al}, 2005). As a result, it is no longer the simple opportunity of moving goods that defines trade facilitation, but also the ease with which this can be done.

This chapter addresses the relationship between ocean shipping and trade, by examining to what extent shipping nowadays still is a facilitator to trade. For this purpose, we first briefly introduce the trade facilitation school of thought in shipping and port management. We then describe in some detail the mechanism of international trade, as well as the specific role of shipping within this mechanism. We aim to connect this to the ongoing work on non-tariff barriers, both theoretical and empirical, that has taken flight in recent years. We finish with some concluding remarks and an outlook on further research.

**Ports and shipping as facilitators of trade**

Theoretical considerations on the relationship between trade and shipping in maritime economics go back to Koopmans (1939), who observed that without the analysis of seaborne trade, the analysis of shipping markets cannot succeed. He also introduces the notion that seaborne trade is inelastic to prices in shipping. Tinbergen (1959) proposed the idea that demands for shipping could be measured by the actual tonnage carried by ships. Their perspective was mainly to find sources for cyclicality in shipping. Trade was such a source, although shipping also creates its own cyclicality (see Zannetos (1966) for an early source on this).
In later studies and publications, the relationship between trade and transportation was developed more, and the element of transport costs was introduced as a variable in classic trade models. The classic approach to model global bilateral trade patterns is a gravity model (for a formal derivation of the gravity equations, see Anderson, 1995). Such a model normally relates bilateral trade flows to national income, population and distance. Distance is often taken to represent transport costs, although this is certainly not a one-to-one correspondence.

Various authors have tried to estimate more elaborate (maritime) transport cost functions, in order to gain a better understanding to what extent high transport costs are a determinant of (i.e., a barrier to) trade. Clark et al. (2004) estimate a maritime transport function that includes determinants for distance, product specific requirements (including value), directional imbalance, total trade volume on a route (to represent increasing returns to scale), technological innovation, anti-competitive practices, and the quality of port and cargo handling infrastructure. They find that seaport efficiency is an important determinant for transport costs. From their analysis, they also conclude that transport costs are potentially a barrier to trade, and need to be considered by policy makers. Arvis et al. (2013) also analyse trade costs, which they derive as an implication of the pattern of bilateral international trade.

The point that ports play an important role in facilitating trade has been made for years. For example, Haralambides and Veenstra (1996) analyse the interaction between ports and the development of trade. They observe that countries’ ambitions to follow an export-led growth strategy has resulted in government retrenchment from ports, and port reform, with both negative and positive consequences. On the one hand, ports have become more efficient, largely due to the involvement of international operators, while on the other hand, liberalization in many countries has resulted in large redundancy programmes for port workers. The authors argue that the efficiency of port operations is not the only relevant indicator, but the entire economic context of a port should be considered: the competitive environment, access infrastructure by land, and the way in which a government or port authority attempts to recoup some of the port reform costs (for the redundancy of port workers, among others) from other parties.

Wilson et al. (2003) put port efficiency in a broader framework of four indicators for trade facilitation:

- port efficiency;
- customs environment;
- regulatory environment;
- service sector infrastructure.

Port efficiency is a measure for the quality of transport infrastructure. Customs environment measures direct customs-related costs and transparency of customs as well. Regulatory environment measures a country’s approach
to regulation and the service sector infrastructure measures the level of national business service levels.

Much of this conceptualization of trade facilitation is very location- or country-based. The modelling of trade flows with gravity models is also rather one-sided in the sense that flows are explained by variables representing exporting and importing countries individually (for a classic source, see Anderson, 1979). The only variable that represents relationships between countries is usually transport cost, for which distance or the CIF/FOB price ratio are used as proxies (Carrère, 2002). As a result, the trade facilitation contribution of the link between any pair of export and import countries is not made explicitly in much of the trade economics literature.

An exception is the work of Hummels et al (2009) who investigate the trade diminishing effect of the market power of shipping companies. Their work confirms the difference in the way shipping lines treat developing and developed countries in terms of transport prices. In other words, shipping lines present themselves differently in different parts of the world, depending on product value, high import and export tariffs and lack of competition on a trade route. Carrying this line of thinking further, it could be that some of the unfavourable treatment of developing countries by shipping lines carries over to the developed countries. There is a case where this mechanism seems to be at work: the import of fresh fruit from South America to Europe, via the Port of Rotterdam. This is a classic CIF trade, where the exporters book the transport. Shipping lines apparently invest very little in their local liner agents in South America, which results in a lot of physical paperwork. The paperwork is then sent to the receiving parties in Europe, who cannot benefit from the higher level of digitization that shipping lines usually offer in Europe. This leads to the transfer of some of the inefficiencies on one side of a trade lane to the other side of the trade lane.

In the next section, we will explore in some more detail how transportation by means of ships also brings complexities to international trade that could be interpreted as trade barriers.

The practice of international shipping

International trade is made up of commercial transactions between buyers and sellers. These can be complete strangers to each other, or part of the same enterprise. For the commercial transaction this does not make much difference, since in many cases, even sister companies need to trade with each other as if they are separate companies. This is called arm’s-length trading, and it has primarily a fiscal background: tax authorities in both import and export countries demand a transaction in which the value of the product is established in a market setting.

The commercial transaction determines the specification of the goods, the price and the number of goods. The transaction usually also contains
an arrangement of who takes responsibility of the shipment of the goods. For this purpose, the International Chamber of Commerce has established some standard trade terms that divide the responsibilities of transportation, ownership and insurance among buyer and seller. These trade terms are called Incoterms. Currently there are 11 Incoterms, which range from the one extreme of the seller taking care of everything (delivery duty paid) to the other extreme of the buyer taking care of everything (ex-works). Important intermediate points where transfers of responsibility can take place are the ocean ports in an international transport chain.

A second important issue in international trade transactions is the relationship between delivery and payment. In an international context, where parties may not know and trust each other, payment and delivery has to take place more or less at the same time. The international transport operator plays an important role in this mechanism. The way this works is that the ocean transport operator can declare that goods were taken on board of the ship, by signing a so-called bill of lading (B/L). This is proof that transportation is taking place, and that payment can be transferred. A copy of the B/L is therefore shared with the bank of the seller, who sends it to the bank of the buyer, who then transfers payment on behalf of the buyer. As a result of this mechanism, the B/L is also a document of title that gives the holder rights to the cargo. This greatly facilitates trading of goods that are in transit.

In cases where the buyer and seller are part of the same enterprise, this process can be simplified. In those cases, a simplified version of the B/L is used – the so-called Seaway Bill – which is basically the same as a B/L, except it is not a document of title.

For container shipping, which is the most relevant part of shipping for the purpose of this chapter, some further issues need to be considered. For a large part, these issues are related to the container.

First of all, the container shipping line generally owns the containers in which goods are shipped, and needs to provide these containers to the shippers who want to ship cargo. This mechanism is fraught with problems. The containers need to be available for the shipper. A shipper does not want to wait too long, and wants a container that is suitable for its needs. There are different types of containers: 20-foot containers, 40-foot containers, 40-foot high cube containers, 45-foot containers, open-top containers, flat beds, foldable containers, refrigerated containers. All these containers conform to the ISO 668 2013 (revised) standard. In addition, commercially, containers may have a five-step scale of cleanliness. The highest level, so-called food grade containers, is the only level that is acceptable for the transportation of food products.

Second, customs authorities consider containers to be packing material that requires, in many countries, some type of temporary import licence. This licence may restrict the time the empty containers can stay in a country. If the container stay too long, VAT and other levies may become payable.

Third, after delivering a container to a destination country, the shipping line would like to return a container as quickly as possible to a paying
customer. For this purpose, the shipping lines all charge fees if the receiver of goods takes too long to pick up the full container, or deliver the empty container back. The first fee is called demurrage (not to be confused with demurrage in bulk shipping), and the second fee is called detention. These two fees are in the range of a few euros per day to as much as 75 euros per day, chargeable after a so-called free period of several days. Of course, the fees and free days are negotiable, so no shipping line’s customer will pay the same as another customer. How the demurrage and detention fees are established will depend on the party who books the transport, and their negotiating power. For transport, this can be either the buyer or the seller.

Because of the need to keep track of containers in countries, formal obligations to report unloaded containers to customs authorities in the destination countries, and the need to only provide the goods in the container to the rightful owner, the shipping line maintains an administrative process in ports in which some fees need to be paid, information for the party who will pick up the container is exchanged, and the empty depot in which the container needs to be returned is recorded. In many ports, this exchange between the agent of the shipping line and the representative of the buyer of the goods is a cumbersome process that takes time and effort. Only when this process is completed can a transport be booked to pick the container up in the port. Often this process cannot take place or be completed until the container is physically unloaded. The buyer’s agent needs to track a terminal’s website to find the unloading confirmation of the container, and then verify all relevant information, take care of payments, and book transport. The degree to which this process is supported with IT – usually a port community system – differs strongly from port to port and from shipping line to shipping line. RSM (2010) has estimated that in Rotterdam, the cost related to these processes can range between 5–25 euros per container. For a customs or freight forwarding agent, who gets 35–50 euros for the administrative handling of a container, this is a substantial cost driver. This is the fourth issue.

A fifth issue is the overall performance of international container lines. Vernimmen et al (2007) have reported on the impact of delays of ocean carriers on logistics variables such as safety stock. Their figures, together with the more recent analysis of Chung and Chiang (2011), result in an average delay for shipping lines of 1.5 days. This delay translates into higher safety stock levels, which are an additional cost for business. Obviously, there are differences between shipping lines, and therefore, the countries that are served by shipping lines with relatively more delays are at a disadvantage compared to countries that are primarily served by carriers with fewer delays.

A sixth issue is that customs authorities tend to use ship manifest data for their initial risk assessment. Countries differ in the time at which they require this information to be submitted. The United States and Europe require this type of data to be submitted before departure from the origin country, and in Europe more or less the same data needs to be submitted again a few days before arrival in the port of destination. Other countries receive this data
shortly before arrival of the ship, or use it to verify imports and exports after loading and unloading has taken place. This formal obligation means that shipping lines and their agents have had to set up a process to gather this data at the right time from their clients or the clients’ agents. To indicate that this imposes costs on the logistics chain, shipping lines charge US$ 25 for submitting pre-departure declarations to European customs authorities in destination countries for every container. Another potential bottleneck is the different ways in which shipping companies facilitate their agents in different countries. In some countries, the information exchange between customers’ agents and the shipping lines’ agents is fully digitized, while in some countries, the information exchange is still with paper documents. The latter is not only a problem for that country, but also for all the other countries to which the ships are sailing to unload cargo. All errors and other problems related to paper-based information exchange are transferred to these destination countries as well.

A final point deals with the pricing structure of container shipping. The complicated tariff structure of container shipping is well documented in the maritime economics literature. It is well known that, apart from a base transport tariff, shipping companies may charge a bunker adjustment factor (BAF), a currency adjustment factor (CAF), port congestion charges, piracy risk charges, terminal handling charges, war risks, security surcharges, winter surcharges, dangerous goods and refrigeration surcharges, and document fees. Cariou and Wolff (2006) looked into the BAFs and the underlying bunker price developments, and found that these charges do not accurately reflect the underlying cost development. In other words, some of these surcharges are used to raise the price for transport. These surcharges can easily raise the total transport bill by 50 per cent or more, and they make the transport cost for ocean shipping complex and difficult to interpret. The chosen Incoterms determine which party books ocean transport. This can also have an effect on the height of certain charges, as well as the basic transport tariff.

In summary, current shipping line operations result in time delay and costs for logistics chains, either due to administrative processes, formalities the shipping line has to carry out, or enforcement measures to increase the circulation of containers. Hummels and Schaur (2012) estimate the impact of time delays on trade, and find that each day’s delay reduces the probability of trade by 1–1.5 per cent. Time delay really is a trade barrier, and ocean shipping, which causes structural delays, can be seen as the cause of this.

In addition, other complexities of container shipping may also cause a barrier to trade. This is confirmed by Nordas et al (2006), whose analysis builds on Hummel's work, and includes logistics services. In their analysis, poor logistics services also translate into time delays, which have a negative effect on trade.

Some of the issues mentioned above exhibit a ‘transfer effect’. This is the case for the quality of information in the shipping documents, and, under
specific conditions, for demurrage and detention. For the former, the provision of information by the seller or his/her agent to the shipping line may be so poor that the buyer will run risks of additional customs inspection, delays and addition costs. For the latter, the condition is that the seller books transport under the chosen Incoterms. This is common practice, for instance, in the trade of fresh fruit originating from the southern hemisphere. In these cases, the seller may choose to limit demurrage and detention free time in the port of destination, since this is costly for him. The buyer will then be very limited in his or her options to transport containers out of the port, or run a high risk of incurring demurrage or detention fees.

To investigate to what extent this type of thinking has been recognized in current efforts to measure non-tariff barriers to trade, in the next section we look in some detail at these measurement efforts.

International trade research and non-tariff barriers

Definition of non-tariff barriers

Through the initiatives of the Global Agreement on Trade and Transport (GATT) and the World Trade Organization (WTO) negotiation rounds, trade tariffs, ie the duties paid on imported or exported goods, have generally decreased worldwide. (For more details, see the historical overview of trade policy measures in the World Trade Report (WTO, 2013).)

As a result, the attention of WTO and other trade policy bodies has shifted to non-tariff barriers. Defined narrowly, these are all trade barriers that are not tariffs (Deardorff and Stern, 1997). However, almost always what is meant is that the non-tariff barriers are actively engineered by policy-makers. This means that non-tariff barriers that are studied by academics and trade policy analysis can always be traced back to some policy goal of one or a group of countries.

Carrère and de Melo (2011) provide a useful classification of non-tariff barriers that refers to the UNCTAD 2006 classification of non-tariff barriers. We have reproduced their list in Table 2.1. (See also UNCTAD (2013) for a more detailed list.)

Observe that pre-shipment inspection and other formalities are listed as a non-tariff barrier. The pre-shipment declaration to customs in Europe (and the US) – the so-called entry summary declaration or ENS – could therefore be characterized as a non-tariff barrier. Since this is a policy driver, this really is a non-tariff trade barrier.

Some of the fees charged by shipping lines, as well as the limitations put on containers (demurrage and detention) could fall under the headings ‘distribution restrictions’, if they were part of some country’s policy. But since they are measures put forward by business, these restrictions are usually not considered to be non-tariff barriers.
TABLE 2.1 Classification of non-tariff barriers

<table>
<thead>
<tr>
<th>Import measures</th>
<th>Technical measures</th>
<th>Non-technical measures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sanitary and phytosanitary measures</td>
<td>Pre-shipment inspection and other formalities</td>
</tr>
<tr>
<td></td>
<td>Technical barriers to trade</td>
<td>Price-control measures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Licences, quotas, prohibition and other</td>
</tr>
<tr>
<td></td>
<td></td>
<td>quantity-control measures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Charges, taxes and other para-tariff measures</td>
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<td></td>
<td></td>
<td>Finance measures</td>
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<tr>
<td></td>
<td></td>
<td>Anti-competitive measures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trade-related investment measures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Distribution restrictions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Restrictions on post-sales services</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Subsidies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Government procurement restrictions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intellectual property</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rules of origin</td>
</tr>
<tr>
<td>Export measures</td>
<td>Export-related measures (including export subsidies)</td>
<td></td>
</tr>
</tbody>
</table>

SOURCE Carrère and de Melo (2011)

To broaden our understanding of the way in which shipping-related restrictions are considered as non-tariff barriers, in the next section we will describe some of the recent efforts to measure trade and business barriers on a global scale.

Global trade barrier measurement

In this section, we will describe several global efforts to measure barriers to trade, or to doing business internationally. We will concentrate on the following three measurement efforts:

- World Bank: Logistics Performance Index;³
- World Bank and International Finance Corporation: Global Doing Business report;⁴
- World Economic Forum: Enabling Trade Report.⁵

Logistics Performance Index (LPI)

The LPI was developed around 2005–2006, and aims to measure the performance on trade logistics of all countries in the world. It is compiled on the basis of freight forwarder and express carrier surveys, supplemented by

The LPI consists of six components (LPI, 2014):

- the efficiency of customs and border clearance;
- the quality of trade and transport infrastructure;
- the competence and quality of logistics services;
- the ease of arranging competitively priced shipments;
- the ability to track and trace consignments;
- the frequency with which shipments reach consignees within scheduled or expected delivery times.

In 2014, the LPI was published for 160 countries. In Table 2.2 we provide a summary of the top five and bottom five countries for 2014.

Note that the first three items could be seen as inputs for logistics performance (customs, infrastructure, competence), and the last three (shipments, tracking, timeliness) as output, effectively measuring time, cost and reliability. The first three items are subject to policy-making.

The six components of the LPI are based purely on perception of respondents. The LPI also has a ‘national’ variant, where countries can evaluate themselves, which is based on targeted questions for each of the six components. For instance, quality of trade and transport infrastructure distinguishes between ports, airports, roads, rail, warehousing and telecommunication infrastructure, as well as quality of transport services for various modes and logistics activity types. The outcomes of the national and the general LPI are not compared for consistency.

While the analysis of the LPI is very country-oriented, the detailed data per country do, in principle, allow a bilateral generalized distance analysis on items that might provide some further insight in the way maritime transport contributes to logistics performance, eg quality of port infrastructure, quality of maritime transport, maritime transhipment delay on some major trade lanes. Such a generalized distance measure could also be used to represent the transfer effect of ocean shipping, in the sense that a bigger gap may result in a larger transfer effect.

Global Doing Business report (GDB)

The GDB report (GDB, 2014) focuses on benchmarking regulation that affect private sector firms. Eleven areas of business regulation are reviewed for 189 countries. These 11 areas are: 1) starting a business; 2) dealing with construction permits; 3) getting electricity; 4) registering property; 5) getting credit; 6) protecting investors; 7) paying taxes; 8) trading across borders; 9) enforcing contracts; 10) resolving insolvency; and 11) employing workers. Based on these 11 areas, an overall ranking of countries is also constructed. The GDB report has been published 11 times between 2004 and 2014.
<table>
<thead>
<tr>
<th>Country</th>
<th>LPI overall</th>
<th>Customs</th>
<th>Infrastructure</th>
<th>Competence</th>
<th>Shipments</th>
<th>Tracking</th>
<th>Timeliness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>4.12</td>
<td>2</td>
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<td>4.01</td>
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<td>7</td>
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<tr>
<td>Singapore</td>
<td>4.00</td>
<td>3</td>
<td>2</td>
<td>8</td>
<td>6</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>Eritrea</td>
<td>2.08</td>
<td>153</td>
<td>159</td>
<td>136</td>
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<tr>
<td>Congo, Rep.</td>
<td>2.08</td>
<td>160</td>
<td>157</td>
<td>146</td>
<td>148</td>
<td>147</td>
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<td>156</td>
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<tr>
<td>Somalia</td>
<td>1.77</td>
<td>147</td>
<td>160</td>
<td>160</td>
<td>159</td>
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</tr>
</tbody>
</table>

**Source:** LPI (2014)
For this chapter, the section on ‘trading across borders’ is the most relevant. This area is characterized by the following items:

- number of documents for export;
- time to export in days;
- cost to export in US$ per container;
- number of documents to import;
- time to import in days;
- cost to import in US$ per container.

In Table 2.3 we summarize the overall value and the score on the trading across borders category for the top five countries in the GDB index.

The focus of the GDB is very much on regulation. Within the trading across borders category of the index (right-hand column of Table 2.3), there is therefore a lot of attention on the customs-related impact on documents, time and costs. This is not exclusively so, however. The time component of the index also contains port and terminal handling and inland transport and handling time, while the cost component contains costs related to port and terminal handling and inland transport and handling. However, there is no way to differentiate between customs-related documents, time and costs, and transport-related documents, time and costs.

Similar to the LPI, based on the trading across border indicators, a generalized distance measure could be obtained for combinations of countries, but this measure would represent a combination of customs- and transport-related items.

**Enabling Trade report**

The Enabling Trade (ET) report studies supply chain-related barriers to international trade (ET, 2014). The ET Index is based on four sub-indices, and seven pillars. These are:
1 Sub-index A: Market access
   – Pillar 1: Domestic market access
   – Pillar 2: Foreign market access

2 Sub-index B: Border administration
   – Pillar 3: Efficiency and transparency of border administration

3 Sub-index C: Infrastructure
   – Pillar 4: Availability and quality of transport infrastructure
   – Pillar 5: Availability and quality of transport services
   – Pillar 6: Availability and use of ICT

4 Sub-index D: Operating environment
   – Pillar 7: Operating environment

Market access basically measures a country’s tariff regime. Border administration reflects quality and efficiency of the customs and other supervision processes in a country. Infrastructure assesses the availability and quality of transport infrastructure, services and IT. Operating environment measures institutional factors that impact import and export.

Within these pillars, data on 56 indicators are gathered from proprietary datasets at the World Bank, WTO, UNCTAD, International Trade Centre and various other partners in the project. Some of these indicators, 23 in total, originate from the World Economic Forum Executive Opinion Survey, which gathers 13,000 responses from 148 countries. Apart from the ET Index, these data are also used to compute the Global Competitiveness Index, the Networked Readiness Index and several other indices.

A summary of the ET Index and its sub-indices is provided in Table 2.4.

The ET report, under the title The Road Ahead, explicitly addresses the measurement of non-tariff barriers, which it considers inadequate. There is ongoing research by the International Trade Centre to collect data on non-tariff barriers, both for cross-border measures and for behind-the-border measures.

Another interesting area for further research, according to the authors of the ET report, is that the infrastructure sub-index should be strengthened with connectivity indicators that might replace simple indicators such as available transport capacity. For international ocean transport such indicators already exist – the UNCTAD Liner Shipping Connectivity Index and the Transshipment Connectivity Index – which are included in the ET Index. For air transport such an index is still being developed, while for domestic connectivity, no index exists yet.

The UNCTAD Liner Shipping Connectivity Index (see www.unctad.org) is derived from characteristics of the maritime transport link for specific pairs of countries: the number of ships visiting that country, the total container carrying capacity of those ships, the maximum vessel size, the number
### Table 2.4 Summary of the Enabling Trade (ET) Index

<table>
<thead>
<tr>
<th>Country</th>
<th>ET Index</th>
<th>Market access</th>
<th>Border administration</th>
<th>Infrastructure</th>
<th>Operating environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore</td>
<td>5.9</td>
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<td>1</td>
<td>2</td>
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<td>Hong Kong SAR</td>
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<td>37</td>
<td>11</td>
<td>2</td>
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<tr>
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<td>5.3</td>
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<td>8</td>
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<tr>
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<td>75</td>
<td>2</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>5.2</td>
<td>75</td>
<td>7</td>
<td>4</td>
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<tr>
<td>Switzerland</td>
<td>5.2</td>
<td>71</td>
<td>12</td>
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<td>44</td>
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<tr>
<td>Sweden</td>
<td>5.1</td>
<td>75</td>
<td>3</td>
<td>17</td>
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<tr>
<td>Germany</td>
<td>5.1</td>
<td>75</td>
<td>13</td>
<td>6</td>
<td>12</td>
</tr>
</tbody>
</table>

**Source**: ET (2014)
of services and the number of companies offering these services. The data is available per country, but also for all country pairs.

To further illustrate that there is a relationship between some of the transport-related indicators and trade, we present some results from Arvis et al. (2013). They derive a measure of trade costs from bilateral trade patterns, and then test the impact of various determinants from the global trade barrier measurement efforts and other sources on these trade costs. Their analysis includes: the cost of starting a business (GDB), the LPI overall index, the air and liner shipping connectivity indices, exchange rates, regional trade agreement membership, tariffs, same country, common border, common colonizer, common language (official and ethnographic), common border and distance. They find that distance, tariffs and the costs of doing business impact trade costs positively (in other words, they increase trade costs), while all other measures decrease trade costs. This is clear evidence for the development of further measures that help identify barriers to trade.

**Summary and conclusion**

In this chapter, we have repositioned shipping in the debate on trade facilitation. Shipping and ports facilitate trade, but researchers are recognizing more and more that transport or trade costs are an important factor in explaining bilateral trade patterns and that factors that impact these trade costs negatively can be considered a barrier to trade.

We then provided an overview of some of the operational bottlenecks caused by or associated with container shipping: demurrage and detention, pre-shipment declarations to customs, the operations and formalities related to the container, the structural delay of container ships, the complicated tariff structure of container transport and the low quality of data on shipping documents. These items translate into costs and time loss, which translate directly as barriers to trade. In addition, since shipping connects countries, we also argued that the way a pair of countries differ on specific variables may be a determinant for the level of trade costs and the level of trade between those countries. We have argued that through these items, current ocean shipping operations are also a barrier to trade.

We have discussed a general classification of non-tariff barriers to trade, and various global attempts to measure non-tariff trade barriers. Most of these efforts are based on collecting information for individual countries. These efforts do provide good basic data to develop measures that represent gaps between countries, such as the LPI. These gap measures could be used to explain the quality of transport links, that could be measures, for instance by the data underlying the UNCTAD Liner Shipping Connectivity Index. As far as we know, such an analysis has not been conducted.

Thinking in terms of relationships between countries, the Enabling Trade Index seems to be ahead of the other two efforts considered here. It contains
elements that represent transport connectivity, which are based on measures of transport capacity and transport service level on routes between countries. However, the index and the data of the ET Index are still represented at an individual country level.

The global measurement efforts (LPI, GDB, ET) do not reflect barriers to trade related to container shipping. All these indices concentrate on collecting information at country level, and not on the country-to-country relationship. There are two positive points, however. The first is that with the consistent measurement of trade barriers and the indexing of countries, gap measures for pairs of countries can be constructed more easily. Second, the ET Index contains elements from the UNCTAD Liner Shipping Connectivity Index, which is an effort to include information on bilateral transport relationships between countries. This index, however, still concentrates on transport capacity and connectivity, and not on operational bottlenecks that we have identified.

We leave for further research the incorporation of bottlenecks related to container shipping operations into formal trade barrier measurement efforts such as the ET Index. An extension of the UNCTAD Liner Shipping Connectivity Index seems to provide a good basis for this. We also suggest the development of gap measures for pairs of countries based on the LPI, GDB or ET, and the use of these gap measures as determinants for trade patterns or trade costs. In particular, gap measures based on some of the detailed transport-related elements of the LPI should shed some light on the way the quality of transportation between countries plays a role in explaining trade patterns or trade costs between those countries.

Notes

1 The Transatlantic Rate Fixing Agreement (TAA) was abolished in 1994, its follow-up, the Transatlantic Conference Agreement (TACA), was eventually terminated in 2003, and in 2006, the block exemption for liner conferences was repealed altogether. In the USA, the Ocean Shipping Reform Act of 1998 also effectively abolished conferences, even though it still allowed rate discussion agreements between liner companies.

2 Private communication with a representative of the industry association of fruit importers in the Netherlands, Frugi Venta.


4 http://www.doingbusiness.org/ [accessed 6 July 2014].


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