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UNCTAD DITC and DTL joint work:

Maritime connectivity index

Bilateral liner shipping connectivity

Executive Summary

Maritime transport is at the core of international trade in merchandises. Around 80% of volume of goods exchanged in the world are transported via sea, and this share is even higher for most developing countries. Most trade in manufactured and intermediate goods is nowadays moved in containerized transport services, and recent research has shown that the introduction of containerization has had a stronger impact on trade than trade liberalization. In terms of value, containerized general cargo exceeds 90% of all general cargo. Containerization links the manufacturer or producer with the ultimate consumer or customer even if their individual trade transaction would not economically justify chartering a ship. Thanks to a network of regular container shipping services with transhipment operations in so-called hub ports, basically all countries are today connected to each other.

Assessing bilateral liner shipping connectivity

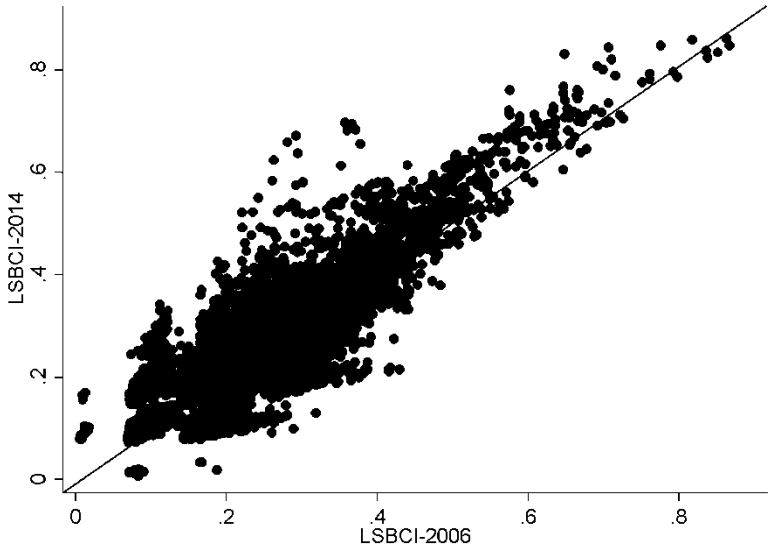
Despite the crucial role played by liner shipping connectivity in determining a country's trade performance no comprehensive bilateral measure of such connectivity has as yet been produced. A recent work by UNCTAD attempts to fill that gap for a set of 155 coastal countries observed for 9 years between 2006 and 2014.[1] It proposes an extension of UNCTAD's already existing country-level Liner Shipping Connectivity Index (LSCI) based on a proper bilateralization transformation to generate the Liner Shipping Bilateral Connectivity Index (LSBCI). The LSBCI is meant to reflect specifically the liner shipping connectivity between pairs of countries. The LSBCI includes 5 components. For any pair of countries A and B represented in the reference sample, the LSBCI is based on: 1) the number of transhipments required to get from country A to country B; 2) the number of direct connections common to both country A and country B; 3) the geometric mean of the number of direct connections of country A and of country B; 4) the level of competition on services that connect country A to country B; 5) the size of the largest ships on the weakest route connecting country A to country B. In order to establish a unit free index all components are normalized using the standard formula Normalized_Value=(Raw-Min(Raw))/(Max(Raw)-Min(Raw)). The LSBCI is then computed by taking the arithmetic average of the five normalized components. As a consequence, the LSBCI can only take values between 0 and 1.

[1] M. Fugazza and J. Hoffmann, 2015. Bilateral Liner Shipping Connectivity since 2006, forthcoming in UNCTAD's POLICY ISSUES IN INTERNATIONAL TRADE AND COMMODITIES RESEARCH STUDY SERIES.

Facts

Figure 1 scatters the LSBCI of the 11935 country pairs making the reference sample in 2014 against the value of their LSBCI in 2006. Points above the 45-degree line represent country pairs whose LSBCI has increased between 2006 and 2014. Points below the 45-degree line represent country pairs whose LSBCI has decreased between 2006 and 2014. A majority of country pairs, namely 67 percent, moved up in terms of LSBCI performance.

Figure 1: LSBCI variation between 2006 and 2014



Source: Authors' calculations from UNCTAD's Liner Shipping Connectivity Matrix, based on data provided by Lloyds List Intelligence

A decomposition of the variation observed between 2006 and 2014 suggests that most of the improvement has occurred since 2010. A more precise analysis indicates that indeed the LSBCI has stagnated for a large majority of country pairs in the immediate aftermath of the 2008 economic crisis for taking off only after 2010.

Results further indicate that besides developed countries and essentially European countries only Eastern Asian countries are part of the top 20 country pairs. However, their presence is clearly more marked in 2014 and 2010 than it was in 2006. Seven of the top twenty country pairs are constituted by Eastern Asian countries and one country pair involves China. Moreover the China-Hon Kong (China SAR) pair was at the top of the list in 2010. It moved down to the fourth rank in 2014 but still with a small progression in its LSBCI value. A deeper analysis shows that the top 50 LSBCIs are found on connections between maximum 15 countries and that the top 250 LSBCIs are found on connections between maximum 40 countries. Bottom country pairs are composed by essentially small and remote islands (e.g. Cook Islands Montserrat, Nauru) or poor developing countries with a very weak centrality index.

Driving forces

Table 1 sheds some light on the contribution of each LSBCI component. We consider positive and negative variations of the LSBCI separately in order to assess more precisely the contribution of each component.

Table 1: Decomposition of changes in LSBCI: positive versus negative variation 2006-2014

	Number of Transhipments	Common Direct	Geo. Direct	Carriers Constraint	Ship Size Constraint	LSBCI
Negative	-0.101	-0.029	-0.0295	0.0068	-0.0045	-0.157
Positive	0.093	0.0176	0.042	0.0193	0.068	0.2403

Source: Authors' calculations from UNCTAD's Liner Shipping Connectivity Matrix

The number of transhipments component plays a crucial role particularly in cases where the LSBCI variation is negative. The other two components reflecting the centrality of the country pair in the liner shipping network (Common Direct and Geo. Direct) play also a major role in cases where the LSBCI variation is negative. However, the contribution of both the carriers and the ship size components is close to zero. In cases where the LSBCI increases, all components do participate in shaping that variation. The strongest influence is from the Number of Transhipments component and the Ship size component.

Data for Policy

The definition and construction of the LSBCI based on reliable data on fleet deployment is clearly of empirical interest. The index and its components are expected to reflect to large extent freight costs. The definition and construction of the LSBCI, however, goes beyond some empirical considerations. Its inter-temporal dimension and the possibility to monitor changes in the index and its components over time could be extremely helpful in framing practical policy orientations. The LSBCI framework offers a unique globalized view of the liner shipping network and hence offers the possibility to appreciate the position in that network of a specific country within several dimensions. The LSBCI could become a useful monitoring instrument and benchmark for policy making.

Connecting landlocked countries

Maritime connectivity is clearly an issue also for landlocked countries as they are fully relying on the maritime connectivity of their transit countries. A clear and precise appreciation of landlocked countries specificities requires a dedicated and possibly systematic analysis that could only benefit from the LSBCI framework.