CLIMATE POLICY-MAKING IN SHIPPING

HOW TO ESTIMATE MARITIME TRANSPORT COSTS TO ENABLE BETTER INFORMED IMPACT ASSESSMENTS?

Shipping webinar || Tue, 31 Mar 2020 || 9-10 am EST
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Welcome – original plan

Source: Dominik Englert, 2019
Welcome – current situation

Source: Hapag-Lloyd, 2012
OUTLINE

1 Intro – Estimating maritime transport costs
2 Top-down – Leveraging CIF and FOB values
3 Bottom-up – Using AIS data and match-making
4 Pilot – Exploring the future database
5 Q&A – Asking nice or challenging questions
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The reality of transport costs

Figure 3.5. Transport and insurance costs of international trade, 2006–2016
(Percentage share of value of imports)

Source: UNCTAD secretariat calculations.
Note: All modes of transport; the least developed countries grouping includes 48 countries for all periods up to 2016.
Why estimating transport costs?

To better understand the implications of potential policy measures

Sample question:
How would potential policy measures such as GHG mitigation measures impact the price (freight rate) that countries pay for the transport of their foreign trade?

Source: Jan Hoffmann
Components of transport and trade costs

- Operating costs
- Maintenance costs
- Voyage costs
- Cargo-handling costs
- Capital costs
- Ship running costs
  - Geographical and geopolitical factors
  - Shipped product
  - Market-specific factors
  - Infrastructure
- Maritime transport costs
  - Air transport costs
  - Land transport costs

Source: Rojon et al. (forthcoming 2020)
**UNCTAD** and the **World Bank** (supported by the University College London) have joined forces to develop a joint global transport costs database for public use:

"How to approach transport costs"?

**Top-down approach:** the price (freight rate)
- Bilateral trade volumes from Comtrade+
- CIF/FOB ratios
- Mode of transport

**Bottom-up approach:** the actual cost
- AIS data (ships’ voyages)
- Information on fuel prices
- Information on charter rates
- Trade data from Comtrade+
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Origin of the Comtrade data

UNSD → UN Comtrade → UNCTAD → International transport and trade dataset

Tariff line data

National coordinating agency (NSO / Central Bank)

UNCTAD

Port authorities

NSO

Fiscal authorities

Enterprise surveys

Shipping manifests

Customs office

Central Bank

Currency exchange records, bank statistics

VAT records

Customs declarations

3 Bottom-up – Using AIS data and match-making
Variables in Comtrade and Comtrade+

• Country of origin (imports), country of destination (exports)
• Breakdown by product group
• **Cost, insurance & freight (CIF)** value of imports, **Free on board (FOB)** value of exports
• Quantity

**New (in Comtrade+):**

• FOB value of imports
• Breakdown by mode of transport
• Country of consignment for imports and exports
• Customs procedure for imports and exports
### What are we measuring?

<table>
<thead>
<tr>
<th>Invoice price</th>
<th>Terms of delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FOB value</strong> (Free on board)</td>
<td>Seller’s obligation is fulfilled “when the goods have passed over the ship’s rail at the named port of shipment” or have been “handed over, cleared for export, into the charge of the carrier”</td>
</tr>
<tr>
<td><strong>CIF value</strong> (Cost, insurance &amp; freight)</td>
<td>Seller covers the “costs and freight necessary to bring the goods to the named port of destination”, including insurance against loss or damage during carrier</td>
</tr>
</tbody>
</table>

**Mode of transport** = mode of transport when goods enter the economic territory of the country

**Country of origin** = country in which the good was “wholly produced” or received its “substantial transformation” (→ Revised Kyoto Convention)
Structure of the output dataset

<table>
<thead>
<tr>
<th>Origin</th>
<th>Destination</th>
<th>Product</th>
<th>Mode of transport</th>
<th>Year</th>
<th>Quantity</th>
<th>CIF value</th>
<th>FOB value</th>
<th>Transport &amp; insurance costs</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
Basic method

**Transport and insurance cost** = CIF value - FOB value

**Measurement** from the import side

**Product breakdown:** 6 digits Harmonized System

**Definition of countries:** UNCTAD classification of economies
# Methodological challenges

<table>
<thead>
<tr>
<th>Data source complexity</th>
<th>Data gaps</th>
<th>Inaccuracies</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Data cube with several dimensions</td>
<td>• Non-reported flows</td>
<td>• Misclassification of products</td>
</tr>
<tr>
<td>• Different coding systems</td>
<td>• Missing FOB value</td>
<td>• Misclassification of country of origin</td>
</tr>
<tr>
<td>• Pioneer exercise</td>
<td>• Missing quantity</td>
<td>• Underreporting</td>
</tr>
<tr>
<td></td>
<td>• Missing Mode of Transport</td>
<td>• Measurement error</td>
</tr>
</tbody>
</table>
Development steps

Data integration

Setup of the data architecture
Extraction of source data
Transcoding, filtering, aggregation
Preparation of dissemination tools

Data editing

Filling gaps
- Mirroring
- Applying fixed unit values and CIF-FOB ratios
- Mode choice models
Cleaning from inaccuracies
- Identifying implausible cases
- Checking for outliers
- Comparison with data from trading partners
- Solving misclassifications in products and country of origin

Reconciliation

Comparison with bottom-up approach
Adjustments
Development steps

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Reconciliation
- Comparison with bottom-up approach
- Adjustments

3 Bottom-up – Using AIS data and match-making
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Deriving voyages and fuel consumption

Source: Wendela Schim van der Loeff, 2020
Estimating key cost components

1. Fuel consumption and derived fuel cost
2. Voyage duration and derived chartering cost

Source: Wendela Schim van der Loeff, 2020
Matching AIS activity and maritime-specific trade

Maritime trade

Commodity-specific expected vessel type

Assigned appropriate AIS voyage

Source: Wendela Schim van der Loeff, 2020
Sharing some preliminary results

Source: Wendela Schim van der Loeff, 2020
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Login data during trial phase

URL: tiny.cc/pilot-database
Login: TransCostTeam
Password: TransportCost*2020
Expiry date: Tue, April 21, 2020

EXPERIMENTAL SERIES. These data are classified ‘experimental’ meaning they are series that are still being tested and are not yet fully developed. These statistics cannot be considered official and should not be used for analyses yet.
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Questions & Answers

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