Impact of slow steaming for bulk carriers

Assessment of the impacts on transport costs for different ship sizes

Jakob Graichen
IMO ISWG-GHG Side Event
London, 7 May 2019
Background

- Initial IMO GHG strategy:
  - 50% reduction compared to 2008 by 2050
  - Peaking as soon as possible
  - “use of speed optimization and speed reduction as a measure”

- Relationship between slower speeds and fuel consumption follows a cubic function:

<table>
<thead>
<tr>
<th>Speed reduction</th>
<th>5%</th>
<th>10%</th>
<th>15%</th>
<th>20%</th>
<th>25%</th>
<th>30%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel savings</td>
<td>14%</td>
<td>27%</td>
<td>39%</td>
<td>49%</td>
<td>58%</td>
<td>66%</td>
</tr>
</tbody>
</table>

- Slow steaming most promising high-impact short-term measure to reduce GHG emissions from shipping
Impact of slow steaming on GHG emissions (dry bulk, oil tanker and container fleet)

Slow steaming and transport costs

- Crucial questions for
  - Exporting countries/industries: how will slow steaming impact their market position?
  - Importing countries (and especially SIDS): how will slow steaming impact consumer prices?
- Most studies assess the impact of CO$_2$ prices on the sector and nations (e.g. World Bank 2019, Vivid Economics 2010)
- Case studies have assessed the impact of slow steaming on exporting nations (e.g. CE Delft 2017)
- This study assess the impact of slow steaming on transport costs which affect both exporter’s market position as well as consumer prices
Slow steaming and transport costs

- Main contributors to transport costs:
  - Capital costs (purchasing or leasing of vessel)
  - Operational costs (crew, insurance, repairs, …)
  - Voyage costs (fuel, port charges, …)
  - Earnings of ship owner

- Longer transport times will lead to higher costs/trip for:
  - Capital costs, operational costs, earnings (proportional increase with time at sea)
  - Fuel costs for auxiliary engines (proportional increase with time at sea)
  - Fuel costs savings (main engines) depend on the speed reduction (cubic relationship)
Methodology to model impact of slow steaming on transport costs

- Model calculates relative change of transport costs per trip
- All parameters are calculated as daily rates
- Distance does not affect relative results; absolute costs strongly depend on distance.
- Modelling for three different ship types and ranges for some parameters:

<table>
<thead>
<tr>
<th>Ship type</th>
<th>Fuel consumption</th>
<th>Auxiliary fuel consumption</th>
<th>Speed</th>
<th>Operation costs</th>
<th>Capital costs</th>
<th>Earnings</th>
</tr>
</thead>
<tbody>
<tr>
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<td>[$/day]</td>
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<tr>
<td>Panamax</td>
<td>37.7</td>
<td>10 (5 – 15)</td>
<td>13.8</td>
<td>5 700</td>
<td>2 700</td>
<td>10 000 (5 000 – 15 000)</td>
</tr>
<tr>
<td>Handysize</td>
<td>22.2</td>
<td>10 (5 – 15)</td>
<td>12.7</td>
<td>5 000</td>
<td>2 200</td>
<td>7 500 (4 000 – 12 000)</td>
</tr>
<tr>
<td>Capesize</td>
<td>55.5</td>
<td>10 (5 – 15)</td>
<td>13.6</td>
<td>6 700</td>
<td>5 500</td>
<td>12 500 (5 000 – 20 000)</td>
</tr>
<tr>
<td>Source:</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>IMO (2014); Greiner (2017); Kemene (2018); UNCTAD (2018)</td>
</tr>
</tbody>
</table>

- Fuel price assumption: 500 (250-750) USD/ton
Impact of slow steaming on transport costs in the reference case

![Graph showing relative change of total trip costs](#)
Impact of slow steaming on handysize bulk carriers
Impact of slow steaming on Panamax bulk carriers

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**Graphs:**

1. **Change of total trip cost vs. Speed reduction**
   - Baseline
   - High fuel costs
   - Low fuel costs

2. **Change of trip cost vs. Speed reduction**
   - Baseline
   - High earnings
   - Low earnings

3. **Change of total trip cost vs. Speed reduction**
   - Baseline
   - High auxiliary
   - Low auxiliary

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**Notes:**

- **Baseline**
- **High fuel costs**
- **Low fuel costs**
- **High earnings**
- **Low earnings**
- **High auxiliary**
- **Low auxiliary**

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**Source:**

- Slow Steaming & transport costs | Jakob Graichen | London | 7 May 2019
- Oeko-Institut e.V.

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**Website:**

- www.oeko.de
Impact of slow steaming on Capesize bulk carriers

Graphs showing the impact of speed reduction on total trip cost for different scenarios:

- Baseline
- High fuel costs
- Low fuel costs

- Baseline
- High earnings
- Low earnings

- Baseline
- High auxiliary
- Low auxiliary

Graph 1: Change of total trip cost vs. speed reduction (Baseline, High fuel costs, Low fuel costs)
Graph 2: Change of total trip cost vs. speed reduction (Baseline, High earnings, Low earnings)
Graph 3: Change of total trip cost vs. speed reduction (Baseline, High auxiliary, Low auxiliary)
Key messages

- For most scenarios slower steaming will bring down transport costs;
- Fuel price has highest impact on economic viability of slow steaming;
- Depending on the ship type there is a) an economically optimal speed (minimum) and b) a maximum speed reduction which would maintain transport cost (break even point);
- Impact on freight rates depends on the cost-pass through and might be smaller than the actual change of transport costs;
- Maritime transport costs contribute with less than 5% to consumer prices in most cases; small changes in either direction will not have a significant impact.
Jakob Graichen
Senior Researcher

Öko-Institut e.V.
Büro Berlin
Schicklerstraße 5-7
10179 Berlin
Estimation of bulk freight costs for a selection of illustrative routes and different assumption

<table>
<thead>
<tr>
<th>Round trip</th>
<th>Speed reduction</th>
<th>Typical speed</th>
<th>Days at sea</th>
<th>Reduced fuel consumption (main engine)</th>
<th>Total daily fuel consumption</th>
<th>Main engine</th>
<th>Auxiliary engine</th>
<th>Fuel consumption costs</th>
<th>Operation costs (other than fuel consumption)</th>
<th>Capital cost</th>
<th>Earnings</th>
<th>Total cost</th>
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<tr>
<td>Bulk, Panamax (500)</td>
<td>20,000</td>
<td>0</td>
<td>13.6</td>
<td>60.5</td>
<td>37.7</td>
<td>33.9</td>
<td>2,262</td>
<td>1,140,765</td>
<td>344,953</td>
<td>163,399</td>
<td>605,180</td>
<td>672,423</td>
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<td>Bulk, Panamax (250)</td>
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<td>0</td>
<td>13.8</td>
<td>60.5</td>
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<td>33.9</td>
<td>2,282</td>
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<td>344,953</td>
<td>163,399</td>
<td>605,180</td>
<td>1,683,914</td>
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<tr>
<td>Bulk, Capesize (500)</td>
<td>30,000</td>
<td>0</td>
<td>13.6</td>
<td>91.8</td>
<td>55.5</td>
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<td>6,000</td>
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<td>Slow Steaming &amp; transport costs</td>
<td>Jakob Graichen</td>
<td>London</td>
<td>7 May 2019</td>
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